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ON NEW AND LITTLE-KNOWN BUTTERFLIES FROM  
THE INDIAN REGION, WITH A REVISION OF THE  
GENUS *PLESIONEURA* OF FELDER AND OF AUTHORS.

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(With Plates A, B.)

Subfamily SATYRINÆ.

1. LETHE TRISTIGMATA, Elwes, Pl. A, Fig. 4, ♀.

*L. tristigmata*, Elwes, Proc. Zool. Soc. Lond., 1887, p. 444; idem, id., Trans. Ent. Soc. Lond., 1888, p. 318, n. 50, pl. viii, fig. 1, male.

HABITAT: Sikkim.

EXPANSE: ♀, 2·6 inches.

DESCRIPTION: FEMALE. UPPERSIDE, *both wings* coloured as in the male. *Forewing* with the dark transverse band towards the end of the cell enclosing a paler space, and the zigzag discal band beyond the cell more prominent, the latter more distinctly outwardly defined with lighter; the submarginal series of five round spots from the costa to the second median interspace much larger and more prominent. *Hindwing* with the markings as in the male, but all larger and darker, the ferruginous marginal line very distinct, defined on both sides by a very fine dark line. UNDERSIDE, *both wings* marked as in the male, but all the bands and spots larger and more prominent, the ground-colour strongly tinged with clear ochreous.

The unique female specimen above described is contained in Mr. Otto Möller's collection, and was obtained at Kala Pookri, 10,000 feet, in Native Sikkim, on 19th July, 1888.

2. MYCALESIS (*Samanta*) MISENUS, n. sp., Pl. A, Fig. 8, ♂.

HABITAT: Sikkim, Khasi Hills.

EXPANSE: ♂, 2.2 to 2.4; ♀, 2.4 to 2.6 inches.

DESCRIPTION: MALE and FEMALE. UPPERSIDE, *both wings* may be known from *M. nicotia*, Doubleday and Hewitson (this being the rains-form, while *M. langi*, de Nicéville, is the dry-season form of one species), by the ground-colour being darker, the ocellus of the *forewing* in the first median interspace almost invariably smaller. UNDERSIDE, *both wings* with the ground-colour fuscous instead of pale brown, the striations pale brown instead of ochreous. MALE may be known by the "scent-fan" below the costa of the hindwing on the upper-side being ochreous, in both forms of *M. nicotia* it is deep black.

Mr. Otto Möller and I independently discriminated this species as distinct from *M. nicotia* by the conspicuously darker ground-colour of the underside; it was only afterwards that the marked difference between the two species in the colour of the hairs of the "scent-fan" was noticed. With a darker ground-colour in *M. misenus* one would expect to find these hairs darker (had this been possible) than in *M. nicotia*, but the contrary is the case.

I have described this species from three males and two females from Sikkim obtained by Mr. Otto Möller (from April 1st to May 1st, i.e., in the dry-season), and two males and four females from the Khasi Hills by the Rev. Walter A. Hamilton. It appears probable that this species only occurs in the ocellated form, as is the case in *M. (Samanta) heri*, Moore, and *M. (Pachama) suaveolens*, Wood-Mason and de Nicéville. Mr. Elwes seems to have misunderstood *M. nicotia*,\* but I think that the above remarks will enable any one to discriminate between that species and *M. misenus*. The upperside of typical *M. nicotia* is well figured in the "Genera of Diurnal Lepidoptera;" I also have given a good figure of both sides of the non-ocellated form of it (*M. langi*) in Trans. Ent. Soc. Lond., 1884, pl. iii, fig. 3, male. Mr. Elwes' figure of *M. nicotia* does not show the basal striation of the underside, which is a most characteristic feature of the species, and appears to have been drawn from a female of *M. suaveolens*.

\* Trans. Ent. Soc. Lond., 1888, p. 306, n. 25, pl. ix, fig. 5, female.

3. *YPITHIA LYCUS*, n. sp., Pl. A, Fig. 2, ♂.

*Y. motschulskii*, Marshall and de Nicéville (*nec* Bremer and Grey), Butt. of India, vol. ii, p. 214, n. 202 (1883).

HABITAT : Khasi hills.

EXPANSE : 1·5 to 1·6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* dark glossy brown, *cilia* paler brown. *Forewing* with a small black bipupilled subapical ocellus with a pale ochreous obscure outer ring; a broad oblique black patch of scales differently-formed from those on the rest of the wing from the inner margin to the middle of the disc. *Hindwing* with a small well-formed round ocellus in the first median interspace. UNDERSIDE, *both wings* dull brown, finely and densely striated with pale ochreous. *Forewing* with the ocellus of the upperside but larger, with an outer broad yellow ring. *Hindwing* with a large subapical ocellus, a slightly smaller one in the first median interspace, a still smaller bipupilled one at the anal angle—in one specimen this latter ocellus is round and bears a single pupil only—all these ocelli black, with a prominent silver pupil and an outer yellow and lastly a fine dark ring. FEMALE, paler throughout than the male, but does not otherwise differ except in the absence of the “male mark,” and the greater prominence of the subapical ocellus of the forewing on the upperside.

Through the kindness of Mr. J. H. Leech, who has sent me a male of the true *Y. motschulskii*, Bremer and Grey, from China, I am able to discriminate between that species and its Indian ally. The latter is considerably smaller, has narrower wings, darker *cilia*, no dark submarginal line to either wing on the upperside, and differs conspicuously in the hindwing on the underside being brown with very fine pale ochreous striation; in *Y. motschulskii* the ground-colour is white, with coarse dark brown striation.

As far as I am at present aware, *Y. lycus* occurs only near Shillong in the Khasi hills, flying at any rate from March to July, and has no non-ocellated form.

## Subfamily NYMPHALINÆ.

4. *ARGYNNIS CLARA*, Blanchard, Pl. A, Fig. 6, ♀.

*A. clara*, Blanchard, Jacquemont's Voy. dans l'Inde, vol. iv, Zoologie—Insectes, p. 20, n. 14, Insectes pl. ii figs. 2, 3, *male* (1844); id., de Nicéville, Butt. of India, vol. ii, p. 136, n. 428 (1886).

HABITAT : Tihri Garhwal, Western Himalayas.

EXPANSE : ♀, 2·? inches.

DESCRIPTION: FEMALE. UPPERSIDE, *both wings* with the fulvous coloration of the male almost entirely overlaid with dark bronzy-greenish scales, all the black markings larger. *Forewing* with the middle spot in the cell placed upon a fulvous ground, the disc with fulvous streaks between the veins, a submarginal series of whitish spots. *Hindwing* with a prominent series of rich fulvous spots extending between the two inner discal series of black spots, no other fulvous markings whatever. UNDERSIDE, *both wings* as in the male.

Mr. P. W. Mackinnon obtained this species in large numbers through his native collectors in several places in Tihri Garhwal at considerable elevations in August. The specimens were mostly somewhat worn; it probably emerges about the middle of July.

#### Family LYCÆNIDÆ.

##### 5. BIDUANDA CINESOIDE<sup>3</sup>, n. sp., Pl. A, Fig. 7, ♂.

HABITAT: Selangore, Malay Peninsula.

EXPANSE: ♂, 1.6 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* violet-blue. *Forewing* with a marginal narrow black line; a large round black glandular patch of modified scales beyond the end of the cell, extending slightly into it, anteriorly bounded by the upper discoidal nervule, posteriorly by the second median nervule. *Hindwing* with an oblique black band extending from the base of the short outermost tail to the abdominal margin above the anal notch, beyond which the outer margin is white, bearing a very fine black line; the tails white, black at their bases; a very large intensely black elongated patch of modified glandular scales below the costa. *Cilia* of the forewing blackish, of the hindwing anteriorly blackish, posteriorly white. UNDERSIDE, *forewing* orange-rufous, the inner margin broadly pale and highly polished. *Hindwing* with the anterior half orange-rufous, gradually merging into the white area of the posterior half of the wing; an oblique zigzag narrow black band extending from the middle of the abdominal margin to near the end of the second subcostal nervule, where the band is much attenuated and turned upwards parallel with the outer margin; beyond this narrow band is another still narrower and more zigzag band enclosing a ferruginous line, with a band of metallic amethystine-violet placed outwardly against it, the inner portion of the latter above the anal notch enclosed by a short black line centred with ferruginous; a black spot on the anal lobe, and another larger one in the first median

interspace just within the margin; a fine marginal black line; tails as above.

Very near to the "*Myrina*" *cinesia* of Hewitson,\* from Borneo, from which it appears to differ in the presence of the "male-mark" on the upperside of the forewing; on the upperside of the hindwing there is a black band in the anal region, with a considerable white band beyond it, which latter is not found in *B. cinesia*, and on the underside of the hindwing in the inner black band being half as wide, the outer band also much narrower, and enclosing a ferruginous line, in *B. cinesia* it is wholly black; the middle tail is also more than one-third longer in my species.

6. ZEPHYRUS ZOA, n. sp., Pl. A, Fig. 3, ♂.

HABITAT: Sikkim.

EXPANSE: ♂, 2.0 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* black. *Forewing* with all but the outer margin (which is somewhat broadly and evenly of the ground-colour) and the veins (which are black) clothed with powdery rich metallic iridescent dark green scales; this colour in some lights is quite invisible. *Hindwing* with a patch of similar green scales in the middle of the wing, the costa and outer margin being broadly of the ground-colour, the abdominal margin a little paler fuscous. UNDERSIDE, *both wings* dull fuliginous black. *Forewing* with a deeper black disco-cellular mark outwardly defined by a fine silvery white line; an indistinct, somewhat broad, straight blackish discal band from the costa to the first median nervule outwardly defined by a fine silvery white line; an indistinct blackish submarginal band which widens out on either side of the first median nervule, and is there rather prominent. *Hindwing* with a short blackish bar near the base of the costal interspace inwardly defined by a fine silvery white line; a narrow disco-cellular line outwardly surrounded with white; the usual W-shaped discal prominent line, silvery white inwardly, slightly defined by a narrow blackish line; the outer margin broadly sprinkled with white scales; a prominent marginal large oval deep black spot circled with orange in the first median interspace; an anal deep black spot crowned with orange, which latter colour extends on one side to the first median nervule, on the other in a narrow line for some short distance up the abdominal margin,

\* *Myrina cinesia*, Hewitson, Ill. Diurn. Lep., p. 29, n. 5, pl. xiii, figs. 18, 19, *male*; 20, *female* (1863).

where it is inwardly bounded by a fine black line and then by a line of turquoise-blue; a fine anteciliary white line, obsolete towards the apex. *Thorax* above anteriorly clothed with hairs, which are ferruginous in some lights, posteriorly with green hairs; *abdomen* black above, pale fuscous below.

This species belongs to the group which contains *Thecla* [*Zephyrus*] *tsangkie*, Oberthür, and *T. desgodinsi*, Oberthür,\* from Thibet, but appears to be quite distinct from either. It differs from the former in being larger; it has no brilliant blue spots on the margin of the hindwing on the upperside on either side of the tail, and the colour of the underside is black, not brown. From the latter (of which the female only is known) it also differs in the ground-colour of the underside, and in the discal white lines being straight, instead of outwardly convex as in *T. desgodinsi*, and in the presence of the bar in the costal interspace on the hindwing. *T. diamantina*, Oberthür,† which is also of this group, appears to have the green colour on the upperside of the male less powdery, and reaches much nearer to the outer margin. It was described from the Isle of Askold. From the description alone *Z. zoa* appears to come very near to "*Dipsas*" *japonica*, Murray,‡ but that species is said to have no disco-cellular markings on the underside, and has also a third black spot with whitish scales in the middle between the two large ones on either side of it on the underside of the hindwing near the anal angle not found in my species. To judge of it also from the late Mr. H. Pryer's figures in his "*Rhopalocera Nihonica*" the male has the green coloration of the upperside much more extensive than in *Z. zoa*.

A single specimen has been obtained by Mr. A. V. Knyvett on Tiger's Hill, above Darjiling, at 8,000 feet elevation, on 26th June, 1888.

7. ARHOPALA AIDA, n. sp., Pl. A, Fig. 1, ♂.

HABITAT: Pegu Yoma; Mergui; Tenasserim Valley.

EXPANSE: ♂, 1.60; ♀, 1.45 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* shining bluish-purple of exactly the same tint as in *A. selta*, Hewitson, and *A. rafflesii*, mihi. *Forewing* with the outer margin broadly black (a little

\* Études d'Ent., vol. xi, pp. 20, 21, pl. vii, figs. 51—56 (1886).

† Études d'Ent., vol. v, p. 18, n. 45, pl. i, fig. 1, male (1880).

‡ Ent. Month. Mag., vol. xi, p. 169 (1875).

broad than in *A. selta*). *Hindwing* with the outer black margin even, as broad as in the forewing; the costa more broadly black. **UNDERSIDE**, *both wings* purplish-brown, strongly glossed with purple, all the markings prominent, a little darker than the ground-colour, outwardly narrowly and clearly defined with whitish. *Forewing* with the inner margin broadly paler; an oval spot near the base of the cell; an oblong one at its middle, with a costal spot above it; a quadrate spot closing the cell, also with a costal spot above it; a discal macular band dislocated below the third median nervule, the fourth spot nearer the margin, the two spots which follow further removed from the margin, a large quadrate spot in continuation in the submedian interspace; a pair of submarginal fasciæ, but more prominent than usual. *Hindwing* with the usual basal annular spots, a spot closing the cell, a discal band formed of spots arranged more or less in pairs, the usual marginal lunular fasciæ, the small anal lobe black, a small black spot in the first median interspace on the margin, the space between this spot and the anal angle sprinkled with metallic-green scales. **FEMALE**. **UPPERSIDE**, *both wings* of a lighter more bluish shade than in the male, the outer margins much broader; otherwise as in the male.

Described from a single male (the type) captured by Major C. T. Bingham on the Pegu Yoma, Burma, in December, 1887, and two males and a female captured by Mr. W. Doherty at Mergui and in the Tenasserim Valley, in the cold season of 1888-89. One of these males differs slightly from the type in having all the markings of the underside rather larger and darker, and consequently more prominent.

#### Subfamily PAPILIONINÆ.

#### 8. PAPILIO (*Euplœopsis*) TELEARCHUS, Hewitson, Pl. A, Fig. 5, ♀.

*P. telearchus*, Hewitson, Trans. Ent. Soc. Lond., second series, vol. ii, p. 22, pl. vi, fig. 3, male (1852); *P. (Euplœopsis) telearchus*, Elwes and de Nicéville, Journ. A. S. B., vol. iv, pt. 2, p. 433, n. 122 (1887); *Isamiopsis telearchus*, Moore, Desc. Lep. Coll. Atkinson, p. 285 (1888).

**HABITAT**: Assam, Tavoy, Pongkai.

**EXPANSE**: ♀, 5.4 inches.

**DESCRIPTION**: **FEMALE**. **UPPERSIDE**. *Forewing* brown; costa black basally; a longitudinal streak in the lower basal two-thirds of the discoidal cell, a small streak at the base of the second median inter-

space, a larger one at the base of the first median interspace, a pair of streaks in the submedian interspace, outwardly joined to two oval whitish spots, a large streak on the inner margin—all greyish-ochreous; the apical half of the wing including the outer third of the cell dark brown strongly glossed with purple; an oval spot at the lower outer end of the cell, a discal series of seven spots, and a submarginal series of nine—all white more or less edged with purple of a lighter shade than the purple-glossed ground-colour. *Hindwing* brown; a streak in the cell, and eight streaks round it, one in each interspace—greyish-ochreous; a submarginal series of seven pale ochreous-whitish spots, the upper one oval, the rest dentate; seven small white spots on the margin, one in each interspace. **UNDERSIDE**, *both wings* dull brown, the spots and streaks as above. *Forewing* entirely lacking the purple gloss, and the purple edging to the spots. *Antennæ* black; *head*, *thorax* and *abdomen* black, streaked and spotted with white.

The female of *P. telearchus* is now described for the first time. It is the only specimen of that sex I have seen, though the males are by no means very rare. It is probable that both sexes mimic the corresponding sexes of *Euplœa* (*Trepsichrois*) *midamus*, Linnæus (= *T. linnæi*, Moore), which is certainly the commonest species of the genus in the regions where *P. telearchus* is found. Mr. Moore suggests that it mimics *Euplœa* (*Isamia*) *splendens*, Butler (= *E. rogenhoferi*, Felder). I much doubt this, as that species is always a rare one wherever it occurs; at any rate the female of *P. telearchus* does not mimic it, the opposite sexes of *E. rogenhoferi* being superficially the same, while the female of *P. telearchus* differs widely from the male in coloration and markings as do the opposite sexes of *E. midamus*.

I am indebted to the Rev. Walter A. Hamilton for the loan of the specimen described above. It was obtained by his native collectors in the Khasi Hills below Shillong.

#### Family HESPERIIDÆ.

9. HASORA ANURA, n. sp., Pl. B, Figs. 5, ♂; 1, ♀.

HABITAT: Sikkim, Khasi Hills.

EXPANSE: ♂ ♀, 2.1 inches.

DESCRIPTION: MALE. **UPPERSIDE**, *both wings* deep bronzy-brown, the base and disc thickly clothed with long ochreous-brown hairs; *cilia* ochreous-brown. *Forewing* with a minute subapical transparent



shining yellow dot. **UNDERSIDE**, *both wings* dark brown, somewhat glossed with purple. *Forewing* with the inner margin broadly pale, a broad discal dark band free from purple gloss. *Hindwing* with the basal two-thirds much darker than the outer third, the dark portion well-defined, bearing towards the abdominal margin on the dividing edge a small prominent ochreous spot, an ochreous anteciliary line from the anal angle to the first median nervule, the ochreous spot and line obscure in one specimen; a prominent whitish spot in the middle of the disc in one specimen, obscure in the other. **FEMALE**. **UPPERSIDE**, *both wings* coloured as in the male. *Forewing* with a quadrate spot at the end of the cell, an elongate one below across the first median interspace, its inner edge straight, its outer edge concave; another smaller narrow spot constricted in the middle across the middle of the second median interspace; three increasing subapical dots—all these spots shining translucent rich ochreous. **UNDERSIDE**, *forewing* with the spots of the upperside showing through, the inner margin broadly bright ochreous, otherwise as in the male.

Closely allied to the common *Hasora badra*, Moore, from which it differs in both sexes in having no large anal lobe to the hindwing, this lobe being present in *H. badra* and coloured black on the underside, of which black patch there is no trace in *H. anura*; the latter also is a smaller insect; the female differs in having the three large discal yellow spots of the forewing considerably smaller, and of a deeper richer yellow.

Described from two male and four female specimens in Mr. Otto Möller's collection which shew hardly any variation. They have been selected from ninety-three males and forty-five females of *H. badra*, a very common species in Sikkim, in Mr. Möller's collection. The complete absence of the large anal lobe or tail in *H. anura* makes it distinguishable from *H. badra* at a glance. There is also a specimen of this species from Sikkim in the collection of Mr. G. C. Dudgeon, and a male from Shillong in the collection of the Indian Museum, Calcutta. This latter specimen was submitted for determination to Mr. F. Moore, who pronounced it to be a variety of *H. badra*, but I believe it to be a good species.

I may note that the *Hasora vitta* of Distant\* is the *H. coulteri* of Wood-Mason and de Nicéville.† A specimen from Perak is in the

\* Rhop. Malay., p. 375, n. 2, pl. xxxv, fig. 4, *male* (1886).

† Journ. A. S. B., vol. iv, pt. 2, p. 378, n. 201, pl. xviii, fig. 8, *male*; 8a, 8b, *female* (1886).

Indian Museum, Calcutta, and differs from the type male specimen from Cachar in possessing two minute semi-transparent yellow dots on the disc of the forewing, and a similar spot in the discoidal cell of the hindwing on the underside, characters of no importance. The true *H. vitta*, Butler, which is from Sarawak, Borneo, may be known from *H. coulteri* by having the basal area of the hindwing on the underside glossed with green (*viréscente*); this is not found in *H. coulteri*.

#### 10. HASORA HADRIA, n. sp.

? *Hesperia badra*, Butler, (*nec* Moore), Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 554, n. 3 (1877); *Hasora badra*, Distant, (*nec* Moore), Rhop. Malay. p. 374, n. i, pl. xxxv, fig. 3, male (1886).

HABITAT: Perak, ? Malacca.

EXPANSE: ♂, 2.1 inches.

DESCRIPTION: MALE. UPPERSIDE, both wings as in *H. anura*, mihiis *Forewing* lacking the subapical yellow dot (this however is a trivial character). UNDERSIDE, both wings dull brown, not slightly glossed. with purple as in *H. anura*, or strongly so as in *H. badra*, Moore. *Hindwing* with a small anal lobe bearing a black patch, in *H. anura* there is no black patch or anal lobe, in *H. badra* both are large. This species is probably variable with regard to the presence or absence of a white or greyish spot in the cell of the hindwing on the underside, and a white or greyish streak above the anal angle, as in the two allied species above-named; Mr. Distant describing a "*var.*" of this species as lacking these characters.

I have not figured this species, as Mr. Distant has done so in his "*Rhopalocera Malayana*." I have described it from a single male from Perak in the collection of the Indian Museum, Calcutta, which Mr. Distant ticketed "*Hasora badra*, Moore (*var.*)" I am unable to say whether or not *H. badra* occurs in Malacca, Johore, Java, Borneo, Celebes and the Philippines (localities given for *H. badra* by Messrs. Distant and Butler). The true *H. badra*, Moore, occurs in Sikkim, Assam, Calcutta (one female taken by Colonel G. F. L. Marshall, R. E., in his room at midnight in February), Ceylon Chittagong, Moulmein, and the Andaman Isles (a single female).

#### 11. PARNARA PHOLUS, n. sp., Pl. B, Fig. 3, ♀.

HABITAT: Bhutan.

EXPANSE: ♂, 2.4; ♀, 2.6 inches.

DESCRIPTION: MALE. UPPERSIDE, both wings rich brown with a shining vinous tinge, the spots translucent rich ochreous. *Forewing* with three conjugated subapical spots, the first a mere dot, the next

twice as large, the lowest four times as large as the middle spot; two well-separated spots towards the end of the cell placed inwardly obliquely; a spot about twice the size of these in the middle of the second median interspace, another much larger one completely filling the first median interspace below the innermost spot in the cell, another spot below this at about the middle of the submedian interspace and touching that nervure. *Cilia* concolorous with the wing. *Hindwing* with a small round spot near the end of the cell, three equal-sized spots in a straight line on the disc separated by the second and third median nervules; the base of the wing and the abdominal margin clothed with long yellowish-brown setæ. *Cilia* pale yellow. **UNDERSIDE**, *both wings* as above, but the coloration duller. *Forewing* with the spot in the submedian interspace much larger, its edges diffused, pale yellow. *Hindwing* as on the upperside. *Antennæ* and *legs* black throughout; top of *head*, *thorax*, and top of *abdomen* decreasingly clothed with long iridescent bronze-green hairs, thorax below duller. **FEMALE**, larger than the male. *Forewing* with the lowest subapical spot larger than in the male, the two spots in the cell conjoined. Otherwise as in the male.

Described from a male obtained by Mrs. Wylly, and a female by the native collectors of Mr. Otto Möller, near Buxa, Bhutan, in August. I know of no near ally to this fine species, the largest in the genus hitherto described.

## 12. PARNARA SARALA, n. sp., Pl. B, Fig. 6, ♀.

**HABITAT**: Khasi Hills.

**EXPANSE**: ♂, 1·8; ♀, 2·0 inches.

**DESCRIPTION**: **FEMALE**. **UPPERSIDE**, *both wings* dark bronzy-fuscous. *Forewing* with a large medially constricted spot at the end of the cell; an elongated spot at the base of the second median interspace; a much larger one towards the base of the first median interspace, its outer end concave, its inner end convex, anteriorly and posteriorly touching the second and first median nervules; a comma-shaped spot in the submedian interspace, touching the middle of the submedian nervure—all these spots semi-transparent lustrous white; *cilia* fuscous. *Hindwing* with a large oval pale yellow patch on the middle of the disc; and a small patch on the abdominal margin near the base of the wing; *cilia* rich chrome-yellow at the anal angle, gradually shading off into fuscous anteriorly. **UNDERSIDE**, *both wings* distinctly glossed with rich purple.

*Forewing* with the three discal spots as above, the one in the submedian interspace on the upperside developed into a large outwardly-diffused white patch occupying the middle of the inner margin; a large chrome-yellow quadrate patch above the spot in the cell extending from the subcostal nervure to the costa. *Hindwing* with the oval pale yellow discal patch of the upperside developed into a broad anteriorly-increasing discal chrome-yellow band extending from the abdominal margin to the costa, but with a break between the submedian and internal nervures. *Palpi, thorax,* and *abdomen* above and below clothed with bronzy-green iridescent hairs; *antennæ* with shaft black, club broken off.

The Rev. Walter A. Hamilton, who obtained the two specimens above described, possesses the wings only of a third specimen placed between tale of what appears to be the male of this species captured in the same locality. In the forewing there are two small well-separated spots in the cell instead of one large one, the two spots below are smaller, the spot in the submedian interspace entirely wanting; otherwise as in the female. This specimen does not apparently possess any secondary sexual characters.

I do not know any near ally to *P. sarala*. The shape of the wings agrees with that of the species of the genus *Parnara*, the probable male having the forewing less broad, the apex more acute and the outer margin more straight and inwardly oblique than in the female.

### 13. PARNARA PARCA, n. sp., Pl. B, Fig. 10, ♀.

HABITAT: Sikkim, Khasi Hills.

EXPANSE: ♀, 1·9 inches.

DESCRIPTION: FEMALE. UPPERSIDE, *both wings* deep vinous-brown. *Forewing* with three small subapical spots forming half a circle; two elongated well-separated spots at the end of the discoidal cell; a rhomboidal spot near the middle of the second median interspace; another occupying a similar position in the first median interspace, anteriorly and posteriorly bounded by the second and first median nervules, its inner end well rounded, its outer end convex and the lower corner produced; a rounded spot in the submedian interspace touching that nervure a little beyond its middle—all these spots semi-transparent lustrous white; *cilia* from the inner angle to the second median nervule dull ochreous, anteriorly of the colour of the wing. *Hindwing* with five nearly equal-sized spots forming a rough

oval on the disc, the two lowest spots nearer together than the rest; these spots are translucent white in some lights, metallic pale brassy-greenish in others; *cilia* broadly rich chrome-yellow from the anal angle to the termination of the third median nervule, thence to the apex of the wing vinous-brown. **UNDERSIDE**, *both wings* of the colour of the upperside. *Forewing* with the spots as on the upperside; the dull ochreous *cilia* of the upperside pale clear yellow, that colour extending a little distance on to the wing. *Hindwing* also with the spots as above; the chrome-yellow *cilia* of the upperside is pale clear yellow on the underside, that colour extending irregularly on to the wing membrane beyond. *Antennæ* with the shaft black, becoming ochreous just before the black club; *abdomen* tipped with long chrome-yellow hairs; rest of body, *head* and *pulpi* more or less concolorous with the wings; *femur* and *tibia* of legs black and clothed with very long thick and closely-set black hairs, tarsus anteriorly black, posteriorly deep chrome-yellow, naked.

I place this species but doubtfully in the genus *Parnara*, all the legs being strongly setose, being a character not found in any species of that genus known to me. A somewhat similar character is found in the males only of *Abaratha syrichthus*, Felder, *A. ransonnetii*, Felder, and *A. taylorii*, mihi, all of which possess a tuft of black hairs over a quarter of an inch in length attached to the coxæ of the front legs, and ordinarily lying along the pectus of the butterfly between the middle and hindlegs. These bunches of hairs are probably scent-fans, and are, moreover, probably susceptible of erection and expansion, but accurate observations on the subject on live specimens are desirable. In describing the genus *Abaratha*,\* Mr. Moore stated that the legs are naked, this is certainly not the case with the front legs of the males of the type species. Mr. Distant† is also incorrect in saying that the hindlegs of the type species of the genus are strongly pilose, this applies to the forelegs of the male only. It is also quite certain that the species Mr. Distant places in the genus *Abaratha* (*sura*, Moore, and *pygela*, Hewitson), possess a setose clothing quite different to that found in the true *Abarathas*: these species, I think, should be placed in another genus. In the genus *Casyapa*, Kirby, the males have the tibia of the hindlegs extremely hairy.

*P. parca* is described from a single specimen in my collection obtained by the Rev. Walter A. Hamilton in the Khasi Hills, who

\* Lep. Ceylon, vol. i, p. 181 (1881).

† Rhop. Malay., p. 390 (1886).

possesses the wings of a second example placed between talc from the same region, I also possess another female from Sikkim. I do not know any species at all similarly marked to *P. parca*.

14. CHAPRA MATHIAS, Fabricius, Pl. B, Fig. 7, ♂.

*Hesperia mathias*, Fabricius, Ent. Syst., Suppl., p. 433, n. 289-90 (1798).

I have figured what I believe to be a very unusual variety of this species captured at Pilibhit, Kumaon, by Colonel A. M. Lang, R. E., on 16th December, 1887. It is a male, and has a very prominent spot in the lower subcostal interspace of the hindwing; this spot is semi-transparent, and shows on both sides of the wing. Mr. Elwes refers to this rare varietal form in his paper on the "Lepidoptera of Sikkim."\* My specimen has also a pale diffused band on the underside of the forewing just within the dark anteciliary thread extending from the apex of the wing to the first median nervule; also a large similarly-coloured discal patch on the hindwing, and a marginal band.

15. HALPE AINA, n. sp., Pl. B, Fig. 8, ♂.

HABITAT: Sikkim.

EXPANSE: ♂, 1.36 to 1.44 inches.

DESCRIPTION: Nearest to *H. kumara*, mihi,† of which Mr. Otto Möller possesses eighteen specimens and I six, all from Sikkim. MALE. UPPERSIDE, *both wings* of a more tawny-ferruginous colour, due to the entire forewing and the basal two-thirds of the hindwing being clothed with a thick coating of long hair-like ferruginous scales placed upon a deep brown ground. *Forewing* with two conjoined spots in the discoidal cell, the upper spot answering to the single spot of *H. kumara*, the lower spot twice as large as the upper; three instead of two increasing conjoined subapical spots; the two discal spots much the same: the "male-mark," however, instead of being a long continuous black streak of modified scales as in *H. kumara* presents the appearance of two obliquely-placed yellow spots exactly as in *H. gupta*, mihi,‡ which can be teased out by a pin-point into a quantity of fluffy material like down. UNDERSIDE, *both wings* coloured much as in *H. kumara*. *Forewing* with the translucent yellow spots as on the upperside. *Hindwing* unmarked in eight specimens, in one specimen with two opaque pale yellow discal spots.

Described from five male specimens in the collection of Mr. Otto Möller, and four in my own.

\* Trans. Ent. Soc. Lond., 1888, p. 444, n. 462.

† Journ. A. S. B., vol. liv, pt. 2, p. 121, pl. ii, fig. 10, male (1885).

‡ Journ. A. S. B., vol. lv. pt. 2, p. 254, n. 8, pl. xi, fig. 1, male (1886).

16. *HESPERIA HELLAS*, n. sp., Pl. B, Fig. 9, ♂.

HABITAT: Campbellpur (Punjab).

EXPANSE: 1.05 inches.

DESCRIPTION: Very close to *H. galba*, Fabricius (*superna*, Moore, *evanidus*, Butler, and *evanidus*, var. *adenensis*, Butler), from which it differs on the UPPERSIDE of *both wings* in the white spots being smaller and fewer in number, the discal macular band on the *hindwing* narrower, and notably the UNDERSIDE of the *hindwing* unspotted, but bearing three equi-distant white bands, the first subbasal, somewhat obscure; the second discal, with nearly regular edges, of nearly equal breadth throughout, unbroken, extending from the costa to the white abdominal streak; the third obscure, marginal.

I possess two specimens of this species collected by Major J. W. Yerbury. They can at once be distinguished from the very numerous specimens of *H. galba* before me from Aden, Sind, and indeed from almost all parts of India (the type was from Tranquebar), and from Ceylon, by the prominence and regularity of the bands of the hindwing on the underside, especially the medial one. In *H. galba* the medial band is usually continuous, but it always has very irregular edges, it is often broken up into groups of spots, particularly in some specimens from Aden, and is described as characteristic of *H. evanidus*; this does not, however, appear to be a constant feature, as I find from an examination of specimens from the Hubb river in Colonel Swinhoe's collection, which were captured with the types of that species. Colonel Swinhoe, in his two papers on the Lepidoptera of Karachi, records both *H. galba* and *H. evanidus* from that city, but on a careful examination of his series of both species I am unable to say by what character he separated them, every gradation, as far as I can see, occurring between typical *H. galba* with the medial band on the underside of the hindwing unbroken and typical *H. evanidus* with the band divided into three well-separated spots. I find the same variation also in specimens from Aden.

Genus *CELÆNORRHINUS*, Hübner.

*Celænorrhinus*, Hübner, Verz. bek. Schmett., p. 106 (1816); id., Plötz, Berl. Ent. Zeitsch., vol. xxvi, p. 253 (1882); *Gehlota*, Doherty, Journ. A. S. B. vol. lviii, pt. 2, p. 131 (1889); *Plesioneura* (preoc.), part, auctorum.

FOREWING, *costa* slightly arched, *apex* rather acute, *outer margin* convex, *inner margin* straight; *costal nervure* terminating opposite

the apex of the discoidal cell, *first*, *second*, and *third* subcostal nervules with their bases almost equi-distant, *fourth* subcostal with its base half as near to the base of the third subcostal as that vein is to the second, terminating at the apex of the wing, terminal portion of *subcostal nervure* or fifth subcostal nervule with its base almost touching that of the fourth, terminating on the outer margin far below the apex of the wing; *discoidal cell* long, narrow; *upper disco-cellular nervule* straight, strongly outwardly oblique, very short; *middle* and *lower* disco-cellular nervules almost in the same straight line (the lower a little concave), the lower a little longer than the upper, both veins taken together strongly inwardly oblique; *second median* nervule arising some little distance before the lower end of the cell, *first* median nervule arising much nearer to the base of the wing than to the point where the second median is given off; *submedian nervure* slightly recurved; *internal nervure* short and quickly running into the submedian nervure, with which it entirely anastomoses. HINDWING, *costa* strongly arched at base then straight to apex, which latter is somewhat acute in the male, rounded in the female, *outer margin* rounded, *inner margin* convex; *costal nervure* almost straight, terminating just before the apex of the wing; *first subcostal nervule* originating some distance before the apex of the cell; *upper disco-cellular nervule* straight, very slightly outwardly oblique; *lower* disco-cellular also slightly outwardly oblique, at first concave, then straight, a little longer than the upper disco-cellular; *discoidal nervule* very fine, straight, arising at the point of junction of the disco-cellular nervules; *second median* nervule arising just before the lower end of the cell, *first* median arising much nearer the lower end of the cell than the base of the wing; *submedian* and *internal nervures* straight. Type,\* the *Papilio eligius* of Cramer.

This diagnosis has been made from bleached wings of both sexes of the "*Hesperia*" *leucocera*, of Kollar, from Simla, and of the "*Papilio*" *eligius* of Cramer from the Amazons, for the specimens of which latter I am indebted to Dr. O. Staudinger. All the species of the genus settle with wide outspread wings, which at once distinguishes them in life from the genus *Notocrypta*, mihi, the species of which rest with wings folded upright over the back. *O. leucocera*

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\* *Vide* Mr. Samuel H. Scudder's "Historical Sketch of the Generic Names proposed for Butterflies," in Proc. Am. Acad. Arts and Sciences, vol. x, p. 137 (1875).



in the Western Himalayas is markedly crepuscular, I have seen specimens over and over again flying up and down a short distance of the bed of the Simla river with immense rapidity, so fast that the eye can hardly follow them, settling on a leaf for a second and then flying off again, long after the sun has set. All that are known to me have the hindwing more or less spotted. *C. eligius*, Cramer, was described from Surinam in South America, and Felder states that he has received a specimen from Venezuela. The similarity in the markings of the forewing of this species to those of *C. maculosa*, Felder, from Shanghai, is not a little remarkable. The transformations of only one species are known, those of *C. spilothyrus*, Felder.

(1) *CELÆNORRHINUS ELIGIUS*, Cramer.

*Papilio eligius*, Cramer, Pap. Ex., vol. iv, p. 123, pl. ccciv, fig. H (1781); *Celænorrhinus eligius*, Hübner, Verz. bek. Schmett., p. 106, n. 1142 (1816); *Eudamus eligius*, Felder, Wien. Ent. Monatsch., vol. vi, p. 182, n. 165 (1862); *Tagiades eligius*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 50, n. 45 (1884); *Plesioneura eligius*, Staudinger, Ex. Schmett., p. 300, pl. c, male (1888).

HABITAT: Surinam (*Cramer*); Venezuela (*Felder*); Brazil (*Plötz*); South Brazil, Chanchamayo, Venezuela, Columbia, and Chiriqui (*Staudinger*).

(2) *CELÆNORRHINUS VULTURNUS*, Felder.

*Eudamus vulturnus*, Felder, Wien. Ent. Monatsch., vol. vi, p. 182, n. 165 (1862).

HABITAT: River Negro, South Brazil (*Felder*).

(3) ? *CELÆNORRHINUS COMPRESSA*, Möschler.

*Plesioneura compressa*, Möschler, Verh. zool.-bot. Gesellsch. Wien, vol. xxvi, p. 336, pl. iv, fig. 22 (1876).

HABITAT: Surinam.

*Note*—From the figure and description this species appears to me to belong but doubtfully to this genus.

(4) *CELÆNORRHINUS OCHROGUTTA*, Möschler.

*Plesioneura ochrogutta*, Möschler, Verh. zool.-bot. Gesellsch. Wien, vol. xxxii, p. 330, pl. xvii, fig. 22 (1883).

HABITAT: Surinam (*Möschler*).

(5) *CELÆNORRHINUS FRITZ-GÆRTNERI*, Bailey.

*Plesioneura fritz-gærtneri*, Bailey, Bull. Brooklyn Soc., vol. iii, p. 62 (1881).

HABITAT: Salvador (?), Central America (*Bailey*).

*Note*—I have not seen the description of this species. It is referred to in the Zoological Record for 1881, Insects, p. 169.

## (6) CELÆNORRHINUS MOKEEZI, Wallengren.

*Pterygospidea mokeezi*, Wallengren, Kongliga Svenska vet.-akad. Hand., Lep. Rhop. Caff., p. 54, n. 3 (1857); *Nisoniades mokeezi*, Trimen, Rhop. Afr. Austr., p. 316, n. 210, pl. vi, fig. 5, female (1866); *Hesperia amaxonda*, Trimen, Trans. Ent. Soc. Lond., third series, vol. i, p. 405 (1862).

HABITAT: Caffraria (*Wallengren*); South Africa (*Trimen*).

## (7) CELÆNORRHINUS HUMBLI, Mabilie.

*Plesioneura humbloti*, Mabilie, Ann. Soc. Ent. Belg., vol. xxviii, p. clxxxvii (1884).

HABITAT: Madagascar (*Mabilie*).

## (8) CELÆNORRHINUS PROXIMA, Mabilie.

*Plesioneura proxima*, Mabilie, Bull. Soc. Zool. France, 1877, p. 231.

HABITAT: Congo (*Mabilie*).

## (9) CELÆNORRHINUS SHEMA, Hewitson.

*Pterygospidea shema*, Hewitson, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 322 (1877).

HABITAT: Cayenne and Calabar (*Hewitson*).

## (10) CELÆNORRHINUS MACULOSA, Felder.

*Pterygospidea maculosa*, Felder, Reise Novara, Lep., vol. iii, p. 528, n. 934, pl. lxxiii, fig. 7, male (1867); id., Elwes, Proc. Zool. Soc. Lond., 1881, p. 911.

HABITAT: Shanghai, South China (*Felder*); China (*Elwes*).

Note—Plötz considered this species to be the same as the next. Elwes says they differ considerably in the markings of the hindwing on the underside.

## (11) CELÆNORRHINUS PULOMAYA, Moore.

*Plesioneura pulomaya*, Moore, Proc. Zool. Soc. Lond., 1865, p. 787; idem, id., op. cit., 1882, p. 263; id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 463, n. 532; ? *P. pulomaya*, Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 139, n. 258 (1886); *Hesperia pulomaya*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 252, n. 573 (1857); *Tagiades pulomaya*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 50, n. 47 (1884).

HABITAT: Darjiling and N.-W. Himalayas (*Moore*); Pindari valley, Kumaon, 7—9,000 feet (*Doherty*); Sikkim (*Elwes*); Darjiling (*Horsfield* and *Moore*); South Asia (*Plötz*); Kulu; Masuri; Bhutan.

Note.—This species appears to differ from the preceding in having the spot one-third from the base and the lower of the two spots beyond in the submedian interspace of the forewing on the upperside yellow instead of white, and the cilia of the hindwing very prominently alternately orange and dark brown instead of dark brown intersected with white.

(12) *CELÆNORRHINUS FLAVOCINCTA*, de Nicéville.

*Plesioneura flavocincta*, de Nicéville, Proc. Zool. Soc. Lond., 1887, p. 464, pl. xl, fig. 9, female.

HABITAT: Buxa, Bhutan (*de Nicéville*).

17. (13) *CELÆNORRHINUS PYRRHA*, n. sp., Pl. B, Fig. 11, ♀.

HABITAT: Bhutan, Assam.

EXPANSE: ♂, 1.9; ♀, 2.0 to 2.2 inches.

DESCRIPTION: MALE. UPPERSIDE, *forewing* dark brown, the basal half of the wing clothed with ochreous-yellow scales; a large square spot at the end of the discoidal cell, a rather smaller one below it in the first median interspace, a small one placed outwardly between these two spots in the second median interspace, two still smaller spots placed inwardly obliquely in the submedian interspace below the outer angle of the second spot, the lower one sometimes wanting, five small subapical spots arranged three and two—all these spots semi-transparent diaphanous white; *cilia* dark brown throughout. *Hindwing* dark brown, the basal two-thirds thickly clothed with long ochreous-yellow setæ, some bright yellow spots on the disc; *cilia* alternately dark brown and pale yellow. UNDERSIDE, *forewing* spotted as above, but the anterior spot in the cell continued almost to the costa by two small white spots divided by the costal nervure, two diffused whitish spots placed in the submedian interspace beyond the two diaphanous spots of the upperside. *Hindwing* with all the spots more prominent and paler yellow than on the upperside. *Antennæ* black below throughout, above with a small portion just before the club shining silvery white, the shaft dotted with white. FEMALE: UPPERSIDE, *forewing* as in the male, but in some specimens there is a third white spot in the submedian interspace one-third from the base, and in some specimens also the spot in the cell has two small whitish dots above it almost reaching the costa. *Hindwing* as in the male, but the yellow spots more prominent. UNDERSIDE, *forewing* as in the male, but with the pair of diffused whitish spots placed beyond the two oblique spots in the submedian interspace more prominent; *cilia* in this interspace often pale yellow. *Hindwing* as in the male. *Antennæ* as in the male.

The male differs from *C. sumitra*, Moore, from N.-E. Bengal (which is known to me by the description only), in having the shaft

of the antennæ black anteriorly dotted with white, not anteriorly wholly silvery-white. The male differs from *C. pulomaya*, Moore, from Kulu, Sikkim, and Bhutan in having the lower of the two spots placed obliquely in the submedian interspace of the forewing in both sexes white, in *C. pulomaya* it is yellow. *C. putra*, Moore, from Bengal, is unknown to me; the description agrees, however, with some examples of *C. leucocera*, Kollar.

Described from a single male from Bhutan (I have examined the prehensores, so am certain that the specimen is a male), and six females also from Bhutan, one female from Chenrapunji, and one male and three females from the Khasi Hills.

18. (14) *CELÆNORRHINUS PLAGIFERA*, n. sp., Pl. B,  
Fig. 13, ♀.

HABITAT : Sikkim, Bhutan.

EXPANSE : ♂, ♀, 2·0 to 2·3 inches.

DESCRIPTION : MALE and FEMALE. UPPERSIDE, *forewing* differs from *C. pyrrha*, mihi, in never having a spot one-third from the base in the submedian interspace. *Hindwing* with the spots larger, and of a richer (more orange) yellow colour; the alternate yellow portions of the *cilia* also of a deeper orange. UNDERSIDE, *forewing* lacking the two diffused whitish spots in the submedian interspace beyond the two obliquely-placed transparent spots which are found in *C. pyrrha*; otherwise as in that species. *Antennæ* as in *C. pyrrha*.

I have described this species from nineteen specimens in the collections of Mr. A. V. Knyvett and myself. It appears to be very constant. The sexes are very difficult to discriminate; I have been able to distinguish them only by an examination of the organs of generation.

19. (15) *CELÆNORRHINUS PATULA*, n. sp., Pl. B,  
Fig. 4, ♀.

HABITAT : Sikkim.

EXPANSE : ♂, 2·2; ♀, 2·5 inches.

DESCRIPTION : MALE. UPPERSIDE, *forewing* with the white spots forming the discal band smaller than in *C. pyrrha* and *C. plagifera*, mihi, no spot at the base of the second median interspace, the lower of the two spots in the submedian interspace minute. *Cilia* anteriorly dark brown, posteriorly pale yellow. *Hindwing* with the yellow spots on the disc larger and clearer than in either the above-mentioned species. *Cilia* almost entirely yellow, instead of being prominently

marked with black at the ends of the veins. *Antennæ* with the shaft anteriorly entirely pure silvery-white, in which respect it agrees with *C. sumitra*, Moore, and *C. pero*, mihi. FEMALE. UPPERSIDE, *forewing* with the lower spot in the submedian interspace larger than in the male, as also are the five subapical spots; a minute spot at the base of the second median interspace. *Cilia* posteriorly barely marked with pale yellow. *Antennæ* as in the male.

*C. patula* differs from the description of *C. sumitra* in having two spots in the submedian interspace of the forewing in both sexes instead of one only, the cilia are not alternately broadly brown and orange-yellow, and the female of *C. patula* lacks the yellow costal spot above the oblique discal series of white spots on the upperside of the forewing described in *C. sumitra*.

Described from a single pair from Sikkim. The female of *C. patula* is unique as far as I know amongst this group of the genus in possessing antennæ that are anteriorly white, this being usually a male character. I am certain of the sex of my type specimens, as I have examined the primary sexual organs.

20. (16) CELÆNORRHINUS PERO, n. sp., Pl. B, Fig. 12, ♂.

HABITAT: India.

EXPANSE: ♂, 2.2 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* differ from those of *C. pyrrha*, mihi, in being paler in colour. *Forewing* marked as in that species, but the yellow spot one-third from the base of the wing in the submedian interspace more prominent; *cilia* broadly pale yellow and brown. *Hindwing* as in *C. pyrrha*, but the yellow spots on the disc smaller, and the *cilia* almost entirely pale yellow, only just touched with brown at the ends of the veins, as in *C. patula* and *C. flavocincta*. UNDERSIDE, *both wings* as in *C. pyrrha*, but the spot one-third from the base of the submedian interspace of the *forewing* much larger than on the upperside and white. *Antennæ* shining silvery white anteriorly throughout, posteriorly black. *Palpi* white below instead of pale yellow as in *C. pyrrha*.

*C. pero* agrees with *C. sumitra* in having the antennæ anteriorly white, but differs from the description of that species in having the palpi and front of the thorax beneath white not pale yellow, and in possessing the additional yellow spot one-third from the base and the white spot one-third from the outer margin in the submedian interspace of the forewing on the upperside.

Described from two male examples from Colonel G. F. L. Marshall's collection. They are not ticketed, but I believe they are from the Western Himalayas.

(17) *CELÆNORRHINUS SUMITRA*, Moore.

*Plesioneura sumitra*, Moore, Proc. Zool. Soc. Lond., 1865, p. 787; ? *P. sumitra*, Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 139, n. 257 (1886); *P. sumitra*, Elwes, Trans. Ent. Soc. Lond., 1888, p. 463, n. 533; *Tagiades sumitra*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 51, n. 51 (1884).

HABITAT: N.-E. Bengal (*Moore*); Pindari valley, 7—9,000 feet; Chaudans, 7,000 feet, both in Kumaon (*Doherty*); Rikisum, British Bhutan, 5—7,000 feet (*Elwes*); Bengal, Sumatra (*Plötz*).

(18) *CELÆNORRHINUS EDITUS*, Plötz.

*Tagiades editus*, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 231, n. 32 (1885).

HABITAT: Aru (*Plötz*).

(19) *CELÆNORRHINUS AREA*, Plötz.

*Tagiades area*, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 231, n. 33 (1885).

HABITAT: Bengal, Celebes (*Plotz*).

Note—This species is quite unknown to me.

(20) *CELÆNORRHINUS PUTRA*, Moore.

*Plesioneura putra*, Moore, Proc. Zool. Soc. Lond., 1865, p. 788; *Hesperia putra*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 253, n. 575 (1857).

HABITAT: Bengal (*Moore*); Java (*Horsfield* and *Moore*).

Note—I do not know how to distinguish this species from the following. Herr Plötz considered them the same.

(21) *CELÆNORRHINUS LEUCOCERA*, Kollar.

*Hesperia leucocera*, Kollar, in Hügel's Kaschmir, vol. iv, pt. 2, p. 454, n. 2, pl. xviii, figs. 3, 4 (1844); id., Westwood, Gen. Diurn. Lep., vol. ii, p. 526, n. 18 (1852); id., Moore, Proc. Zool. Soc. Lond., 1865, p. 509, n. 119; *Plesioneura leucocera*, id., op. cit., 1882, p. 263; id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. i, pt. 2, p. 257, n. 119 (1881); id., de Nicéville, op. cit., vol. lii, pt. 2, p. 100 (1883); id., Elwes and de Nicéville, op. cit., vol. iv, pt. 2, p. 441, n. 162 (1886); id., Hampson, op. cit., vol. lvii, pt. 2, p. 367, n. 260 (1888); id., Swinhoe, Proc. Zool. Soc. Lond., 1885, p. 146, n. 151; ? *P. leucocera*, Doherty, Journ. A. S. B., vol. iv, pt. 2, p. 139, n. 259 (1886); *Tagiades leucocera*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 51, n. 49 (1884); *Hesperia leucocerca*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 252, n. 574 (1857); *Plesioneura leucocirca*, Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 529.

HABITAT: Himalayas (*Kollar* and *Westwood*); Lower Kunawur, N.-W. Himalayas (*Moore*); Andamans (*Wood-Mason* and *de Nicéville*); Sikkim (*de Nicéville*); Bombay (*Swinhoe*); Tavoy and Pong-sekai (*Elwes* and *de Nicéville*); Sarju and Kali valleys, Kumaon, 2—5,000 feet (*Doherty*); Bhutan (*Horsfield* and *Moore*); Sikkim (*Elwes*); Nilgiri Hills, 2,000—5,000 feet, common (*Hampson*); Bengal (*Plötz*); Assam, Burma, Orissa, Travancore.

(22) CELÆNORRHINUS SIMULA, Hewitson.

*Pterygospidea simula*, Hewitson, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 321 (1877).

HABITAT: Sumatra (*Hewitson*).

(23) CELÆNORRHINUS MUNDA, Moore.

*Plesioneura munda*, Moore, Journ. A. S. B., vol. liii, pt. 2, p. 48 (1884).

HABITAT: Simla (*Moore*), Kulu, Kashmir.

Note—Mr. Elwes places this species with a query as a synonym of *C. leucocera*, Kollar, but I think it may be kept distinct; it is altogether a much paler insect, with fewer markings on the hindwing (none at all on the upperside) than in that species.

(24) CELÆNORRHINUS CHAMUNDA, Moore.

*Plesioneura chamunda*, Moore, Proc. Zool. Soc. Lond., 1865, p. 788; id., *de Nicéville*, Journ. A. S. B., vol. lii, pt. 2, p. 100, n. 280 (1883); id., *Elwes*, Trans. Ent. Soc. Lond., 1888, p. 462, n. 530.

HABITAT: Bengal (*Moore*); Sikkim (*de Nicéville* and *Elwes*); Khasi Hills.

(25) CELÆNORRHINUS AMBAREESA, Moore.

*Plesioneura ambareesa*, Moore, Proc. Zool. Soc. Lond., 1865, p. 788; id., *de Nicéville*, Journ. A. S. B., vol. lii, pt. 2, p. 87, n. 33, pl. x, fig. 9, female (1883); id., *Swinhoe*, Proc. Zool. Soc. Lond., 1885, p. 146, n. 152; id., *Hampson*, Journ. A. S. B., vol. lvii, pt. 2, p. 367, n. 263 (1888); *Tagiades ambareesa*, *Plötz*, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 52, n. 52 (1884).

HABITAT: Maungbhoom in Bengal (*Moore*); Akra in the Satpuras, Coonoor in the Nilgiri Hills (*de Nicéville*); Mahableshwur (*Swinhoe*); India (*Plötz*); Nilgiri Hills, 2,000—6,000 feet, not uncommon on the southern slopes, rare on the northern (*Hampson*); Khandalla, North Kanara, Trichinopoly, Rutnagherry.

(26) CELÆNORRHINUS SPILOTHYRUS, Felder.

*Eudamus spilothyrus*, Felder, Verh. zool.-bot. Gesellsch. Wien, vol. xviii, p. 283 (1868); *Plesioneura spilothyrus*, Moore, Lep. Cey., vol. i, p. 179, pl. lxvii, figs. 4, male; 4a, female (1881); vol. iii, p. 534, pl. cxi, fig. 3, larva and pupa (1887); id., *Hampson*, Journ. A. S. B., vol. lvii, pt. 2, p. 367, n. 262 (1888).

HABITAT: Metopallium and Kunur in the Nilgiris (*Felder*); Ceylon (*Moore*); Nilgiri Hills, western slopes, September (*Hampson*).

(27) CELÆNORRHINUS FUSCA, Hampson.

*Plesioneura fusca*, Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 367, n. 261 (1888).

HABITAT: Nilgiris, 2,000 to 4,000 feet, not uncommon, and Shevaroy Hills (*Hampson*).

Note—This species differs from the preceding in having the cilia of the hindwing alternately brown and whitish, and from the following species in having the white macular discal band of the forewing broken up into spots instead of being continuous, and ending anteriorly in two small dots on the costa; in *C. nigricans* the band extends uninterruptedly to the costa.

(28) CELÆNORRHINUS NIGRICANS, de Nicéville.

*Plesioneura nigricans*, de Nicéville, Journ. A. S. B., vol. liv, pt. 2, p. 123, pl. ii, fig. 6, female (1885); id., Elwes and de Nicéville, op. cit., vol. lv, pt. 2, p. 441, n. 161 (1886); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 461, n. 527.

HABITAT: Sikkim, Buxa (*de Nicéville*); Tavoy (*Elwes* and *de Nicéville*); Sikkim (*Elwes*); Khasi Hills.

(29) CELÆNORRHINUS TIBETANA, Mabille.

*Pterygospidea tibetana*, Mabille, Ann. Soc. Ent. France, fifth series, vol. vi, p. liv, n. 24 (1876).

HABITAT: Thibet (*Mabille*).

(30) CELÆNORRHINUS DAVIDII, Mabille.

*Pterygospidea davidii*, Mabille, Ann. Soc. Ent. France, fifth series, vol. vi, p. liv, n. 25 (1876).

HABITAT: Moupin, Thibet (*Mabille*).

(31) CELÆNORRHINUS AGNI, de Nicéville.

*Plesioneura agni*, de Nicéville, Journ. A. S. B., vol. lii, pt. 2, p. 87, n. 32, pl. x, fig. 4, female (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 531.

HABITAT: Sikkim (*de Nicéville* and *Elwes*).

(32) CELÆNORRHINUS LAXMI, de Nicéville.

*Plesioneura laxmi*, de Nicéville, Journ. A. S. B., vol. lvii, pt. 2, p. 290, n. 21, pl. xiii, fig. 5, male (1888).

HABITAT: Burma (*de Nicéville*).



21. (33) *CELÆNORRHINUS BUCHANANII*, n. sp., Pl. B,  
Fig. 2, ♀.

HABITAT: Upper Burma.

EXPANSE: ♀, 2.1 inches.

DESCRIPTION: FEMALE. Very closely allied to *C. laxmi*, mihi, from which it differs in its considerably larger size. UPPERSIDE, *forewing* with the white discal band fully twice as wide, not divided into spots, extending uninterruptedly from the costa to the submedian nervure, its edges very irregular, its lower portion posterior to the first median nervule much narrower than the rest of the band; it lacks the two small obliquely-placed black dots found towards the base of the submedian interspace in *C. laxmi*. *Hindwing* instead of possessing two parallel discal macular black bands has a rounded black spot towards the end of the discoidal cell, and a discal series of six black spots, of which the anterior one is round and well-separated from the spot which follows it, the second spot is round, the next pair are the largest and elongated, and the last pair smaller but also elongated; *cilia* of hindwing anteriorly white posteriorly dark brown. UNDERSIDE, *both wings* with the same differences as above, but all the spots of the *hindwing* more prominent.

I believe this to be a species distinct from *C. laxmi*, though a single male of the latter only is known, and the former is described from a single female. The difference in size is very considerable, and is greater than is usually found in the opposite sexes of the *Hesperiidæ*, and the markings also shew marked differences. I have named it after its capturer, Mr. A. M. Buchanan, who obtained it in the Ruby Mine district, Upper Burma.

(34) *CELÆNORRHINUS GOTO*, Mabille.

*Plesioneura goto*, Mabille, Ann. Soc. Ent. Belg., vol. xxvii, p. lvi (1883).

HABITAT: Japan (*Mabille*).

(35) *CELÆNORRHINUS TABRICA*, Hewitson.

*Pterygospidea tabrica*, Hewitson, Ex. Butt., vol. v, pl. *Pterygospidea*, fig. 8 (1873)  
*Tagiades tabrica*, Plötz, Jahr. des Nass. Ver. Natur., vol. xxxvii, p. 53, n. 58 (1884).

HABITAT: Darjiling (*Hewitson* and *Plötz*).

(36) *CELÆNORRHINUS PINWILLI*, Butler.

*Plesioneura pinwilli*, Butler, Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 556, n. 5, pl. lxviii, fig. 4, *male* (1877); id., Distant, Rhop. Malay., p. 400, n. 3, pl. xxxv, fig. 29, *male* (1886); *Gehlota pinwilli*, Doherty, Journ. A. S. B., vol. lviii, pt. 2, p. 131 (1889).

HABITAT: Malacca (*Butler* and *Distant*); Margherita, Assam (*Doherty*).

Genus NOTOCRYPTA, nov.

*Plesioneura*, Felder, Wien. Ent. Monatschr., vol. vi, p. 29 (1862), preoc.; *Plesioneura*, part, auctorum.

Differs from *Celaenorrhinus*, Hübner, in the FOREWING being more triangular, the *middle disco-cellular* nervule being distinctly longer instead of shorter than the lower disco-cellular, concave instead of almost straight, the middle and lower disco-cellular nervules taken together less strongly inwardly oblique; the HINDWING is also shorter and more produced posteriorly, the *costa* is more arched, the *discoidal cell* is distinctly shorter, thus causing all the veins which spring from it (the first and second subcostal, the discoidal, and the three median nervules) to be distinctly longer. There is a marked difference in the length of the *haustellum* or tongue, which in *C. leucocera*, Kollar, measures 1·8 inches, in *N. alysos*, Moore, only ·9 of an inch, or exactly half. Type, the *Plesioneura curvifascia* of Felder.

This diagnosis has been drawn up from bleached wings of both sexes of *N. alysos*, Moore; from Sikkim. All the species of this genus settle with closed wings; through an unfortunate and stupid mistake I once stated that they rest with wide outspread wings. This marked characteristic in life, which at once distinguishes *Notocrypta* from *Celaenorrhinus*, has led me to discriminate these two genera; there is also considerable difference in the outline of the wings, and I believe *Notocrypta* never has the hindwing spotted, except in *N. paralysos*, W.-M. and de N., this being always a feature in *Celaenorrhinus*. The type species, *N. curvifascia*, was described from China, and has been identified by Messrs. Plötz, Doherty and Leech as synonymous with *N. alysos*, Moore, but an actual comparison of specimens is desirable. The transformations of *N. alysos*, Moore, only are known.

(1) NOTOCRYPTA CURVIFASCIA, Felder.

*Plesioneura curvifascia*, Felder, Wien. Ent. Monatsch., vol. vi, p. 29, n. 29 (1862); id., Elwes, Proc. Zool. Soc. Lond., 1861, p. 910; id., Plötz, Berl. Ent. Zeits., vol. xxvi, p. 263, n. 5 (1882); id., Doherty, Journ. A. S. B., vol. lv, pt. 2, p. 139, n. 260 (1886); id., Leech, Proc. Zool. Soc. Lond., 1887, p. 427, n. 133.

HABITAT: Ning-po, China (*Felder* and *Elwes*); China, India (*Plötz*); Bagheswar, 3,500 feet, Kumaon (*Doherty*); Japan (*Leech*).

*Note*—Messrs. Plötz, Doherty and Leech identify the following species with this.

(2) NOTOCRYPTA ALYSOS, Moore.

*Plesioneura alysos*, Moore, Proc. Zool. Soc. Lond., 1865, p. 789; idem, id., op. cit., 1877, p. 593; idem, id., Lep. Cey., vol. i, p. 178, pl. lxxvii, figs. 3, *male*; 3a, *female*; 3b, *larva* and *pupa* (1881); idem, id., Proc. Zool. Soc. Lond., 1882, p. 263; idem, id., Journ. Linn. Soc. Lond., Zoology, vol. xxi, p. 54 (1886); id., Butler, Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 556, n. 2 (1877); id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. xlix, pt. 2, p. 241, n. 80 (1880); idem, id., op. cit., vol. i, pt. 2, p. 256, n. 116 (1881); idem, id., op. cit., vol. iv, pt. 2, p. 390, n. 243 (1886); id., de Nicéville, Journ. A. S. B., vol. i, pt. 2, p. 60, n. 128 (1881); id., Elwes and de Nicéville, Journ. A. S. B., vol. iv, pt. 2, p. 440, n. 160 (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 461, n. 525; id., Mabille, Ann. Soc. Ent. Belg., vol. xxi, p. 33, n. 98 (1878); id., Distant, Rhop. Malay., p. 399, n. 1, pl. xxxiv, fig. 7, *male* (1886); id., Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 363, n. 261 (1838); *Hesperia alysos*, Horsfield and Moore, MS., Cat. Lep. Mus. E. I. C., vol. i, p. 253, n. 577 (1857).

HABITAT: Bengal, Andamans, Ceylon, N.-W. Himalyas, Mergui (*Moore*); Moulmein, Ceylon, Penang, Malacca, Borneo, Java (*Butler*); Andamans, Cachar (*Wood-Mason* and *de Nicéville*); Sikkim (*de Nicéville*); Tavoy and Ponseikai (*Elwes* and *de Nicéville*); Sikkim, Kangra, Andamans, Philippines, Foochow (*Elwes*); Java (*Mabille*); Penang, Province Wellesley, Sungei Ujong, Singapore (*Distant*); Nilgiri Hills, 3,600 feet, northern slopes, rare (*Hampson*); Java (*Horsfield* and *Moore*); Himalayas, Assam, Burma, Orissa, Ganjam, Wynaad, Travancore.

(3) NOTOCRYPTA PARALYSOS, Wood-Mason and de Nicéville.

*Plesioneura paralysos*, Wood-Mason and de Nicéville, Proc. A. S. B., 1881, p. 143, n. 15; idem, id., Journ. A. S. B., vol. i, pt. 2, p. 257, n. 117 (1881).

HABITAT: South Andaman Isles (*Wood-Mason* and *de Nicéville*).

*Note*—Mr. Elwes (Trans. Ent. Soc. Lond., 1888, p. 461, n. 525) identifies this species with the preceding, but it appears to constantly differ from *N. alysos* in possessing a varying number of white opaque lustrous spots on the underside of the hindwing in both sexes.

(4) NOTOCRYPTA RESTRICTA, Moore.

*Plesioneura restricta*, Moore, Lep. Cey., vol. i, p. 178 (1881); id., Wood-Mason and de Nicéville, Journ. A. S. B., vol. iv, pt. 2, p. 390, n. 244, pl. xvii, fig. 5, *male* (1887); id., de Nicéville, op. cit., vol. lii, pt. 2, p. 100, n. 278 (1833); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 461, n. 526; id., Hampson, Journ. A. S. B., vol. lvii, pt. 2, p. 368, n. 265 (1888).

HABITAT : Ceylon (*Moore*) ; Cachar (*Wood-Mason* and *de Nicéville*) ; Sikkim (*de Nicéville*) ; Sikkim, Andamans, Burma (*Elwes*) ; Nilgiri Hills, 2,000—4,000 feet, rare (*Hampson*) ; Bhutan, Assam, Orissa.

(5) NOTOCRYPTA ASMARA, Butler.

*Plesioneura asmara*, Butler, Trans. Linn. Soc. Lond., Zoology, second series, vol. i, p. 556, n. 3 (1877) ; id., Distant, Rhop. Malay., p. 400, n. 2, pl. xxxv, fig. 28 (188) ; *Hesperia asmara*, Horsfield and Moore, M.S., Cat. Lep. Mus. E. I. C., vol. i, p. 253, n. 576 (1857).

HABITAT : Moulmein, Malacca, Java (*Butler*) ; Malacca (*Distant*) ; Java (*Horsfield* and *Moore*).

*Note*—As figured by Mr. Distant, this species has a large quadrate spot at the end of the cell of the forewing, a long narrow one below at the base of the second median interspace, and a third large quadrate spot below the last near the middle of the second median interspace ; three subapical conjoined dots. A good description of this species is much wanted.

(6) NOTOCRYPTA RUFICORNIS, Mabille.

*Plesioneura ruficornis*, Mabille, Ann. Soc. Ent. Belg., vol. xxi, p. 32, n. 93 (1878).

HABITAT : Java (*Mabille*).

(7). NOTOCRYPTA INSULATA, Butler.

*Plesioneura insulata*, Butler, Ann. and Mag. of Nat. Hist., fifth series, vol. x, p. 154, n. 31 (1882) ; idem, id., op. cit., vol. xi, p. 424, n. 88 (1883).

HABITAT : New Britain, Aru (*Butler*).

(8) NOTOCRYPTA PROSERPINA, Butler.

*Plesioneura proserpina*, Butler, Ann. and Mag. of Nat. Hist., fifth series, vol. xi, p. 424, n. 89 (1883).

HABITAT : Aru (*Butler*).

(9) NOTOCRYPTA ALBIFASCIA, Moore.

*Plesioneura albifascia*, Moore, Proc. Zool. Soc. Lond., 1878, p. 843, pl. liii, fig. 3, male.

HABITAT : Hatsiega, Burma, ? Sumatra (*Moore*) ; Moulmein.

(10) NOTOCRYPTA MONTEITHI, Wood-Mason and de Nicéville.

*Plesioneura monteithi*, Wood-Mason and de Nicéville, Journ. A. S. B., vol. lv, pt. 2, p. 391, n. 245, pl. xviii, figs. 3, 3a, female (1886).

HABITAT : Cachar (*Wood-Mason* and *de Nicéville*).

*Note*—This species is very near to the preceding, but has the white discal band of the forewing typically quite twice as broad, and

with an additional spot at the base of the second median interspace. On the underside of the forewing of *N. albifascia* the white band stops short at the subcostal nervure, in *N. monteithi* it extends right up to the costa. These characters may however be sexual, as the male of *N. albifascia* and the female of *N. monteithi* only are known.

(11) *NOTOCRYPTA VOLUX*, Mabille.

*Plesioneura volux*, Mabille, Ann. Soc. Ent. Belg., vol. xxvii, p. lvi (1883).

HABITAT: Philippines (*Mabille*).

(12) *NOTOCRYPTA MICROTHYRUS*, Mabille.

*Plesioneura microthyrus*, Mabille, Ann. Soc. Ent. Belg., vol. xxvii, p. lvii, (1883).

HABITAT: Philippines (*Mabille*).

(13) *NOTOCRYPTA PRIA*, Druce.

*Plesioneura pria*, Druce, Proc. Zool. Soc. Lond., 1873, p. 359, n. 2.

HABITAT: Borneo (*Druce*).

*Note*—The description of this species is so inadequate in the absence of a figure that I cannot be sure that it even belongs to this genus.

(14) *NOTOCRYPTA SIGNATA*, Druce.

*Plesioneura signata*, Druce, Proc. Zool. Soc. Lond., 1873, p. 360, n. 3, pl. xxxlii, fig. 8.

HABITAT: Borneo (*Druce*).

(15) *NOTOCRYPTA TOLA*, Hewitson.

*Plesioneura tola*, Hewitson, Ann. and Mag. of Nat. Hist., fifth series, vol. i, p. 340 (1878).

HABITAT: Tondano (*Hewitson*).

(16) *NOTOCRYPTA CYTHNA*, Hewitson.

*Plesioneura cythna*, Hewitson, Ann. and Mag. of Nat. Hist., fifth series, vol. i, p. 341 (1878).

HABITAT: Not given.

(17) *NOTOCRYPTA FEISTHAMELII*, Boisduval.

*Thymele feisthamelii*, Boisduval, Voy. Astrolabe, Ent., p. 159, Lépidoptères, pl. iii, fig. 6 (1832); *Hesperia feisthamelii*, Blanchard, Voy. Pole Sud, Zoologie, vol. iv, p. 403, Lépidoptères, pl. iii, figs. 19, 20 (1853); *Plesioneura feisthamelii*, Druce, Proc. Zool. Soc. Lond., 1873, p. 359, n. 1; *P. feisthameli*, Plötz, Berl. Ent. Zeitsch., vol. xxvi, p. 262, n. 2 (1882).

HABITAT: Moluccas (*Boisduval* and *Blanchard*); Borneo (*Druce*); Philippines, Moluccas (*Plötz*).

## (18) NOTOCRYPTA RENARDI, Oberthür.

*Plesioneura renardi* (Boisduval, MS.), Oberthür, Ann. del Mus. Civ. di St. Nat. di Genova, vol. xii, p. 467, n. 58 (1878); idem, id., op. cit., vol. xv, p. 529, n. 226 (1880).

HABITAT: Dorey in New Guinea (*Oberthür*).

## (19) NOTOCRYPTA FLAVIPES, Janson.

*Plesioneura flavipes*, Janson, Cruise of the Marchesa, vol. ii, p. 377, n. 93 (1886).

HABITAT: New Guinea (*Janson*).

*Note*—This species is said to be allied to the two preceding, but is larger, the forewing is more acute at the apex, where there are no white spots.

## (20) NOTOCRYPTA LEUCOGRAPHA, Plötz.

*Plesioneura leucographa*, Plötz, *Hesp.*, t. 235 (18 ); idem, id., Berl. Ent. Zeitsch. vol. xxvi, p. 262, n. 1 (1882).

HABITAT: India (*Plötz*).

*Note*—This species is quite unknown to me.

## (21) NOTOCRYPTA VARIANS, Maassen.

*Plesioneura varians*, Maassen, pict. 1, pl. xxxix, fig. 11 (18 ); id., Plötz, *Hesp.*, t. 237 (18 ); idem, id., Berl. Ent. Zeitsch., vol. xxvi, p. 262, n. 3 (1882).

HABITAT: South Asia (*Plötz*).

## (22) NOTOCRYPTA CHIMERA, Keferstein.

*Plesioneura chimera*, Keferstein, vol. i, p. 1 (18 ); id., Plötz, *Hesp.*, t. 238 (18 ); idem, id., Berl. Ent. Zeitsch., vol. xxvi, p. 262, n. 4 (1882); id., Pagenstecker, J. B. Nass Ver., vol. xxxvii, p. 208, pl. vi, fig. 1 (18 ).

HABITAT: India (*Plötz*).

*Note*—This species also is unknown to me.

## (23) NOTOCRYPTA WAIGENSIS, Plötz.

*Plesioneura waigensis*, Plötz, *Hesp.*, t. 240 (18 ); id., Berl. Ent. Zeitsch., vol. xxvi, p. 263, n. 6 (1882); id., Ribbe, *Iris*, vol. i, p. 86, n. 147 (1886).

HABITAT: Waigou (*Plötz*); Aru (*Ribbe*).

## (24) NOTOCRYPTA QUEDA, Plötz.

*Plesioneura queda*, Plötz, Berl. Ent. Zeitschr., vol. xxix, p. 225, n. 2 (1885); idem, id., Stett. Ent. Zeitsch., 1886, p. 87, n. 1a.

HABITAT: Malacca (*Plötz*).

## (25) NOTOCRYPTA ZAWI, Plötz.

*Plesioneura zawi*, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 225, n. 3 (1885); idem, id., Stett. Ent. Zeitsch., 1886, p. 87, n. 1b.

HABITAT: Celebes (*Plötz*).

## (26) NOTOCRYPTA WOKANA, Plötz.

*Plesioneura wokana*, Plötz, Berl. Ent. Zeitsch., vol. xxix, p. 225, n. 4 (1885); idem, id., Stett. Ent. Zeitsch., 1886, p. 87, n. 6b; id., Ribbe, Iris, vol. i, p. 86, n. 146 (1886).

HABITAT: Aru (*Plötz* and *Ribbe*).

## (27) NOTOCRYPTA BASIFLAVA, de Nicéville.

*Plesioneura basiflava*, de Nicéville, Journ. A. S. B., vol. lvii, pt. 2, p. 290, n. 22, pl. xiii, fig. 7, male (1888); id., Hampson, op. cit., p. 368, n. 266.

HABITAT: Nilgiri Hills, Travancore (*de Nicéville*); western slopes Nilgiri Hills, 2,000—3,000 feet, September (*Hampson*).

## (28) NOTOCRYPTA BADIA, Hewitson.

*Pterygospidea badia*, Hewitson, Ann. and Mag. of Nat. Hist., fourth series, vol. xx, p. 322 (1877); idem, id., Desc. Lep. coll. Atk., p. 4 (1879); *Plesioneura badia*, de Nicéville, Journ. A. S. B., vol. lii, pt. 2, p. 88, n. 34, pl. x, fig. 10, male (1883); id., Elwes, Trans. Ent. Soc. Lond., 1888, p. 462, n. 528 (1888).

HABITAT: Sikkim (*Hewitson*, *de Nicéville* and *Elwes*).

## (29) NOTOCRYPTA CÆNIEA, Hewitson.

*Hesperia cænira*, Hewitson, Ex. Butt., vol. iv, *Hesperia* pl. ii, figs. 15, 16, male (1867); id., Plötz, *Hesp.*, t. 241 (18 ); idem, id., Berl. Ent. Zeitsch., vol. xxvi, p. 263, n. 7 (1882).

HABITAT: Old Calabar (*Hewitson*); West Africa (*Plötz*).

*Note*—This species is very abnormally marked, the hindwing bearing a broad medial transverse band of lilac-white on the underside.

## (30) NOTOCRYPTA CRONA, Hewitson.

*Plesioneura crona*, Hewitson, Ann. and Mag. of Nat. Hist., fifth series, vol. i, p. 341 (1878).

HABITAT: Batchian (*Hewitson*).

*Note*—The forewing is said to be crossed by a semi-transparent increasing regular band of orange.

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Messrs. Elwes, Butler and Leech give the *Eudamus bifasciatus* of Bremer and Grey as a *Plesioneura*; the late Herr Carl Plötz in 1882 placed it in the genus *Proteides*, Hübner. I have not seen

it, but to judge from the figure by Ménétriés it appears to belong to Moore's genus *Lobocla*, and allied to the Indian species *liliana* and *casyapa* of Moore. It occurs in China, Japan, and N.-W. Corea.

I am aware that this revision of the genus *Plesioneura* of authors is very imperfect and incomplete, but I hope it may be of some use to systematic entomologists. I possess and have access to none but Indian species, and many of the books in which the original descriptions appeared—especially those by Plötz—are not available. In some cases it is probable that I have placed the species in the wrong genus, or they may not even belong to *Celænorrrhinus* or *Notocrypta* at all.

### EXPLANATION OF THE PLATES.

#### PLATE A.

- Fig. 1. *Arhopala aida*, n. sp., ♂, p. 168.  
 „ 2. *Ypthima lycus*, n. sp., ♂, p. 165.  
 „ 3. *Zephyrus zoa*, n. sp., ♂, p. 167.  
 „ 4. *Lethe tristigmata*, Elwes, ♀, p. 163.  
 „ 5. *Papilio (Euplaeopsis) telearchus*, Hewitson, ♀, p. 169.  
 „ 6. *Argynnis clara*, Blanchard, ♀, p. 165.  
 „ 7. *Biduanda cinesoides*, n. sp., ♂, p. 166.  
 „ 8. *Mycalesis (Samanta) misenus*, n. sp., ♂, p. 164.

#### PLATE B.

- Fig. 1. *Hasora anura*, n. sp., ♀, p. 170.  
 „ 2. *Celænorrrhinus buehananii*, n. sp., ♀, p. 186.  
 „ 3. *Parnara pholus*, n. sp., ♀, p. 172.  
 „ 4. *Celænorrrhinus patula*, n. sp., ♀, p. 182.  
 „ 5. *Hasora anura*, n. sp., ♂, p. 170.  
 „ 6. *Parnara sarala*, n. sp., ♀, p. 173.  
 „ 7. *Chapra mathias*, Fabricius, ♂, p. 176.  
 „ 8. *Halpe aina*, n. sp., ♂, p. 176.  
 „ 9. *Hesperia hellas*, n. sp., ♂, p. 177.  
 „ 10. *Parnara parca*, n. sp., ♀, p. 174.  
 „ 11. *Celænorrrhinus pyrrha*, n. sp., ♀, p. 181.  
 „ 12. „ *pero*, n. sp., ♂, p. 183.  
 „ 13. „ *plagifera*, n. sp., ♀, p. 182.



## NOTES ON MAN-EATING TIGERS.

BY REGINALD GILBERT, BOMBAY.

*(Read at the Society's Meeting on 4th September 1889.)*

I HAVE selected this title, not because I have had particular experience on the subject, or because I am an expert, but because I wish to place on the records of our Society a few facts relating to man-eaters which can be considered as reliable, several of them being cases of man-eaters killed by my friend, Mr. W. B. Mulock, Bombay Civil Service, of our Society, now at home on furlough, and who has most successfully devoted a great deal of his time to the destruction of man-eaters ; another being the case which is known as the Nagpore man-eater, another the "Jaunsar" man-eater, well known in the N.-W. Provinces, and lastly, the case of an alleged man-eater, which I killed this year in Bausda. You must not expect me to give you any thrilling account of some personal adventure where I risked my life to rid the district of a brute long the terror of the inhabitants, because I may say at once that the only man-eater I have killed, exposed me to no more danger than I should incur in any ordinary day's shooting after small game. Indeed, it would scarcely be in accordance with the objects of our Society to read a paper relating to personal adventure of this kind. I only wish to touch on various points which I think may chiefly be of interest to our members from a Natural History point of view, and in the hope that other members may be able to supply us with information on this very interesting subject which they can personally vouch as correct.

Now the general impression prevailing about man-eaters is, that the man-eater is an old brute, more often decrepit than otherwise, perhaps lamed from some former wound, with his teeth broken and his skin always mangy, unable from his infirmities to kill game, his natural food, but obliged to conceal himself near a village path and then to pounce on some solitary human being and devour him, never attacking when there are more than two or three human beings together, and always displaying very great cunning, so that his destruction becomes almost impossible. It is difficult to read books of Indian sport without coming to that conclusion. No reliance, however, can be placed, I fear, on books of sport, with one or two bright exceptions, one of which is Mr. Saunderson's book. Books

of sport are written to be read by the masses, and the first idea of the author is to romance and to write something of an exciting kind to please his readers, and not a strictly accurate account of what the author has himself witnessed or known. These books of sport have therefore little value from a Natural History point of view. I only mention this, because my own opinion is that the general impression about man-eaters is altogether wrong, except as to his display of cunning. I am aware that one swallow does not make a summer, and that many of my hearers may rightly think my opinion on this subject is of little value. Man-eaters are happily so few and far between that the most experienced shikari can in a lifetime only come across a very few. I start then by saying that I believe man-eaters are not different in any way from the ordinary game or bullock-eating tiger, and that age, deformity, injury or otherwise, have nothing whatever to do with the question. Why a tiger turns man-eater I can offer no opinion, and why a tiger never kills a goat, but nevertheless kills such small fry as peacocks, porcupine, or monkeys I also cannot reply to. The universal fear that all animals have to man is no doubt the reason why the tiger seldom happily does turn man-eater. There are some large districts in India infested with tigers where a man-eater is never heard of, whilst there are other smaller districts, one of which I intend hereafter to refer to, where man-eaters are constantly appearing. I wrote to a friend of mine, a Forest Officer in the Berars, who is a very successful and keen tiger-slayer, and who, I thought, could give me some very important information. He however tells me that he has not known a single case of a man-eating tiger, although however he has known of a man-eating panther in his districts in the Berars.

The first man-eater I wish to introduce you to is the tiger we have often read of in our local newspapers as the Nagpore man-eater. As regards this one, I have obtained my information from Messrs. George Anderson and George Moule, Engineers on the Bengal-Nagpur Railway, who have been out on several occasions after the beast, and have reliable means of obtaining accurate information. This man-eater is a tigress, and has the following peculiarities of character, *viz.*, her love of feasting on the employés of the Bengal-Nagpur Railway, of frequenting only a small tract of country, about nine square miles in area, and her great cunning and audacity. She has been killing for three successive years; as far as my informants know, she has killed from twenty-eight to thirty-

eight human beings, but these must be taken as much less than the correct actual number, because my informants only return what the railway officials hear of and confirm, and these returns are mostly of people connected with the railway. In 1889, up to June, she has killed seven people besides wounding others. The district she works in is as I have said about nine square miles only, and is near the Darckasa Railway Station. She appears to live in a rocky and precipitous spur, through which a tunnel has been cut. This spur carries heavy bamboo and other jungle. Several springs of water rise from out of the spur. In many places at the foot of the scarps there are delightfully cool places for her to lie up in, where the ground is always moist. There is also a cave in a detached mass of the spur, which shows many signs of being used by the tigress and the family. A big stone just outside the entrance is scored deep and long with many scratches of their claws. The jungle around the cave is very thick, and the cave is very awkward to get at. "The whole area hunted by the tigress," writes Mr. Anderson, "is hard to determine, but for weeks together it is believed she has hunted within this area of nine square miles or even less." A great number of sportsmen (in fact too many) have been after her without success. She will not return to a kill; if she cannot carry off a carcase to a safe place, she will abandon it altogether. About the middle of January last she began to frequent the railway, being seen at all hours in broad daylight. On 24th February 1889, at 2-20 p.m., she jumped from the top of the slope of a cutting about twelve feet on to the line, where a gang of permanent way-men was at work, snatched up one of them and vanished up the opposite slope in a second. She carried the body to a pool of water about 300 yards off and there ate it. On the 25th February a beat was organised, and three tigers were found at home, in the cave, of which two were shot by Mr. Cleveland and Captain Silver, Adjutant of the B.-N. Railway Volunteers, both of which tigers were young ones, not fully grown, the cubs of the old sinner. On the 29th February, she killed a boy near the same place and carried his body a long way. Mr. Anderson has seen the pugs of a young cub with her, apparently one of her last litter. The cubs that were killed are probably of another former litter. On the 4th March, the tigress attacked a woodcutter near the railway, but was driven off pluckily by his companion, who attacked her with an axe. All April she appears to have kept to the same ground, and in the middle of May she killed another man

near the railway. It appears there have been previous man-eaters in this neighbourhood, so that this tigress may have been educated in this vice by a wicked ancestor or companion of hers. In the year 1883, this particular spur was infested with tigers, and seems to have long been a regular haunt and call for tigers. In May last, Mr. Moule, whilst seated on a *maché* at night had a shot at this tigress, but he was unable to see her properly, and she got off scatheless. It is hoped she will be bagged before long.

I will next take you to the neighbourhood of Sardardevi, Bansda State, where the Dangs Baroda territory and Bansda territory lie contiguous. Near here a tigress in 1834 and 1885 killed a very large number of people, and in 1888 and 1889, in the same neighbourhood, another man-eater sprang up, which became the terror of that district, and killed a large number of people. Mr. Mulock killed the former in May 1885, and I killed that which is supposed to be the latter on 2nd April 1889, so that after an interval of only four years the inhabitants of this district were so unfortunate as to have a second man-eater spring up to take the place of the first. Mr. Mulock has written a very graphic account of how he killed this tigress and two three-quarter grown cubs with her, which he printed, and a copy is in our library. This district is hilly, well watered, and covered with jungle. There is scarcely any cultivation, but villages inhabited by various jungle tribes are scattered about here and there. There are plenty of chetul, sambhur, pig, &c., about, and also plenty of cattle grazing in the jungle, so that the man-eater has little excuse for taking to his evil ways. Mr. Mulock mortally wounded this tigress on the 4th May 1885, and it was only on the 13th May that he actually got it. It was wounded in the jaw, and was unable to eat from the 4th to 13th May. Maggots got into the wound, so that when she was killed "she was exceedingly finely drawn from hunger and emaciation." Mr. Mulock describes her as having a beautifully marked skin. This is apparent from a photograph I have of her in my book. There is no appearance of mange in her skin, nor does Mr. Mulock describe her as appearing injured, so as to prevent her from finding her food in a legitimate feline manner. Mr. Mulock found the same difficulty as I did in getting exact information of the number of people killed, but the evidence he collected showed that a large number of people were eaten by this tigress, and there can be no doubt, as he says, this was the culprit, as writing six months afterwards, he states not a single person had

been killed by tigers, and so far as I can discover not till 1888 did another human being fall a prey to a tiger in this district.

I received an invitation from Mr. A.W. Crawley-Boevey, who was then Collector of Surat, to shoot with him in April 1889 in the Native State of Bansda. I was informed of the ravages of a man-eater in these same Sardardevi jungles, and Mr. Boevey suggested we should go after it if the *kubber* was reliable. I arrived at Bansda on 30th March, when Mr. Boevey at once informed me that the tiger had killed a woman near Sardardevi during the Holi holidays, about fifteen days back, and we agreed it would be well to go over there some ten miles distant and spend a few days after the man-eater or some bears said to be in that neighbourhood. The Rajah of Bansda showed us every kindness and facility, had a camp pitched for us at Sardardevi, and placed a number of sowars, sepoy, shikaris, &c., at our disposal. He is an enlightened Rajah, but not so enlightened as is the English ruler of a neighbouring province, who with one hand doles out a reward to those who kill a tiger, whilst with the other he from time to time pens rules placing needlessly heavy restrictions on those who spend time and money in killing tigers in his province! No rules or restrictions were placed in our way and no permit was required, but a hearty welcome was given us by the Rajah and his Dewan, Mr. Jhaverbhai Nathabai. Whilst riding out to Sardardevi in the early morning, a sowar met us bearing a message from the shikari Hubib, who had for years been Mr. Mulock's shikari, telling us that the man-eater had killed three bullocks belonging to some Brinjarees on the previous afternoon and two bullocks the day before. We hurried on to Sardardevi, where we met Jemadar Abdulla, head of the Dharampore State Police, and a noted shikari who had come to assist us. He informed us that there were two tigers, one they had marked down, the smaller one having eaten and gone off some distance. We found the beaters ready, and at once went off to the jungle, where we found everything ready, passing on the road the Brinjari camp from whence came the bullocks which had been killed. Mr. Boevey was placed up a tree near one of the kills which had not been eaten at all. Soon after the beat commenced, the tiger roared. The beat came on almost up to us when the tiger broke back with a roar through the beaters without damaging any one of them. In fact, Hubib told me he turned out of the way of a beater standing on his direct path, instead of knocking him down and giving him a

pat, as often does occur when an unwounded tiger breaks back. I attributed his breaking back to his being driven over his kill. I have noticed tigers always break back when an attempt is made to drive them over the kill. I should like to know if the experience of others is the same. The second time the beat commenced in the same way, and the tiger was driven into some high grass near Mr. Boevey's tree. He came out with a bound under Mr. Boevey's "mahla." Mr. Boevey saw that he was going straight towards my tree in an open space, and generously sacrificed his shot so as to enable me to get an easy one. I killed him without any trouble, and I have here some photos. of him taken where he fell. He was not a large tiger, nor a mangy one, nor did he appear to be different in any way to an ordinary tiger. He was nine feet long. All the beaters, shikaris, &c., declared that he was the identical man-eater, but could bring me no other evidence than their oft-repeated assertion and the fact that many people had been killed lately in the jungles in the neighbourhood. There was still the tigress to be accounted for, which had been pugged to a distant jungle that morning, and this tigress probably was a man-eater too. In the night I heard the tigress roar several times within a mile from my tent. The next morning and the morning after that we found her pugs at the water where she had drunk close to our camp. These were carried into some likely jungle which we beat on both days without seeing anything of her. On the third day she drank at the same water, passed close to our camp along the same path, and the shikaris declared her to be lying down on the side of a hill. No one had seen her, but they pointed out some vultures sitting in a tree up the hill, and said that she had killed a pig or a chetul, and they stated {most positively she was lying down in a certain spot pointed out to us. In this they were correct. She had killed a pig, and she was lying down in the place indicated. It is difficult to account for the certainty and accuracy of these jungle men in placing the exact whereabouts of a tiger which no one has seen. How we ought to proceed was a question of woodcraft, and our Bheels held a council of war. After considerable discussion they took us up hill, saying they would beat up hill to the guns, but after taking us part of the way they concluded it was too hot for her to go up the hill and it would be better to drive her through some shady jungle at the bottom. We offered no opinion, but simply left it to them to decide. Our knowledge of woodcraft was as nothing compared to theirs. This

tigress also roared when the beat commenced, and came up to some high grass opposite to Mr. Boevey. When the beaters came quite up she went at a rush past Mr. Boevey, who fired twice with a Magnum express. She rapidly made off, and as we could find no blood we had another beat. Whilst walking on ahead we heard a bekri deer bark and saw a peacock fly, which made us sure she was there. To make a long story short, she did not come up to the guns, but started off directly the beat began, passed out at the side under a tree upon which sat a sepoy who saw she had a bullet in her stomach. We found lots of blood, and pugged her up a bit, and then stopped as the sun was sinking, and the shikaris said we should find her dead next day, and if we went on some one would get mauled. Each of us being a *paterfamilias*, under solemn promises to our wives to do nothing rash, we fell in with this view. Next day we found she had drunk at the same place and pugged her into a jungle a mile off. Drops of blood were found on her path. However, although we beat for her all day we could not find her, and after that all trace of her disappeared. All said she was dead somewhere, but we could not find her, and there is no doubt that with an Express bullet in her stomach she must have died. Next day, which was a cruelly hot one, I went out at noon alone to look for her, and also to get information about the depredations of the man-eater. It is impossible to place much reliance on the various statements made to me by the various jungle men I spoke to, because it was very evident they grossly exaggerated. I was told the tiger had killed various people, from forty to 500 in number, and that last rains he had been particularly vicious in killing people engaged in cultivating their small strips of land in the jungle, and even taking people out of bullock carts carrying timber from the forests. I went to see two or three places where people were actually seized. One of these was close to a jungle road to the Dangs, over which a large timber traffic passes. I have here a photo. of one of the jungle roads over which the beast used to pass, and also of a temple to the tiger god which the Bheels erect all over these districts. On the next day Mr. Boevey had to break up camp, and leave for Surat hurriedly, as fast as we could march, in consequence of the Surat fires. I tried unsuccessfully to reason with him, that it was more important to bag man-eating tigers than inspect a fire which would be put out long before he could reach it. However my arguing did not convince Mr. Boevey, and we had to put an end

to a very pleasant trip and march rapidly for the line of rails. The only real accurate information I was able to get was from Mr. Jhaverbhai Nathabai, the Dewan of Bansda, who obtained for me the names of persons killed in the Bansda State; only the villages, dates of death, age, sex, &c., which was embodied in an official document I have. This was made up from the police records of the inquests on the persons killed, and from the reports of the cattle killed in the various villages reported by patels. This only applies to the villages in the Bansda State and not to the adjoining villages in the Dangs, Baroda, and British territory. During 1888, out of thirteen jungle villages in the State he killed in six villages altogether eight people, of which seven were males, the dates of killing 28th June, 3rd July, 22nd October, 2nd November, 4th November, 12th November, 15th December, and 18th December. Of these all were adults except one boy, named Ganda Kalia, aged 13 years. In the same villages during the same period thirty-five cattle were returned as killed. I am sorry I am not able to get any record of those killed in the Dangs or Baroda territory during the same period. I have written to enquire at Bansda if there have been any more cases reported of persons killed by tigers, and I am informed by the Dewan there have been no more cases, so that this strongly supports the view that the tiger I killed was the man-eater.

Some eight years ago or so, Mr. Mulock killed an undoubted man-eater near Toongar, some thirty-five miles from where we are now sitting. I say an undoubted man-eater, because Mr. Mulock was close by when the man was carried off, and went after it at once, and found the half-devoured corpse. Whilst waiting by the corpse the tiger or tigress (I forget which) returned, and Mr. Mulock killed it and made a *post mortem* examination of it, finding parts of the deceased man inside the tiger, so I think we may safely assume this was a man-eater. Mr. Mulock published an account of it at the time, and gave me a copy which I have unfortunately mislaid, but I think I may trust my memory so far as to say there was nothing peculiar about this tiger in any way, and that his skin was not mangy.

I have no doubt you read in the papers a short time ago of a man-eater being killed, called the Jaunsar man-eater. An account was published, in which it appeared that Mr. B. B. Osmaston, of the Forest Department, was out near Chakrata after her with a companion, when Mr. Osmaston shot her whilst she was worrying his friend.



The papers further published an account by an anonymous correspondent of the career of this tigress, and an extraordinary story of the tigress allowing her cubs to play with a man she had taken out of a house in the Himalayas. This story I have not been able to verify, so that I am not able to give you particulars. I wrote, however, to Mr. Osmaston for certain particulars about this tigress, and he has very kindly given me some interesting information about her, which I will give to you almost in his very words.

Man-eaters have been numerous in the Jaunsar district for many years. The district which this tigress frequented was a very large one. She used to make long journeys in a very short time. Having killed a man in one place, she would appear the next night at a place twenty miles off. She frequented a somewhat high belt of the Himalayas, mostly from 5,000 to 10,000 feet high. The spot where Mr. Osmaston killed her at is about 8,000 feet above the sea. No old wounds were visible, but she was very old. Report makes her out to be a man-killer of at least ten years' standing. Her skin was not mangy but a very fair one. The cold climate might, of course, give her a good skin. Her teeth were exceptionally bad. Of her four canines none were sound, and the two upper ones were worn and broken down to about half their original length. They also had two slight cavities in their centres, which were found by probing to extend to a depth of three-quarters of an inch. Mr. Osmaston has sent the drawings of the canines, which can be sketched in our magazine if thought of sufficient interest. About seven or eight porcupine quills, mostly broken off to about three inches in length, were found in the tigress's body. Two were actually embedded in her tongue. There is not very much game suitable for tigers in the district. Buffaloes and men are easily obtainable, and excellent opportunities afforded of seizing them on the march on the mountain sides.

This tigress appears undoubtedly to have been the man-eater, because she actually attacked Mr. Osmaston's companion without provocation, except in so far as was due to the fact that these two gentlemen went up in broad daylight to a buffalo killed by her. The papers stated Government offered a reward of Rs. 500 for her.

I once had another adventure with an alleged man-eater. I have, however, no evidence to offer that it was a man-eater, except the fact that all the shikaris and villagers of the neighbourhood declared that this was the particular miscreant that had eaten a number of

people in the neighbourhood, and that every villager for miles round, in number nearly 500, turned out to assist as beaters. This was in the State of Rewa, a few years back one of the best tiger countries in India, where tigers are always ready for visitors of distinction in a State preserve specially kept for tigers and other large game. Through the kindness of Major Barr, the then Political Agent, I was asked to form one of the usual hot weather party who made an annual campaign against the tigers. We shot in royal style: we had State elephants, shikaris, sowars and all the assistance we required. All we had to do was to go to the places fixed for us by the head shikari when we got *kubber*, and if we did wound a beast, we had only to get on two of the best elephants in India and follow up. Following up a wounded tiger on an elephant I must say is a royal form of sport. It is a grand thing to see a wounded and irate tiger absolutely at your mercy and without incurring any risk to yourself. You have all the fun and none of the danger one experiences in going after a beast on foot. I was once so excited in watching a wounded tiger charging from a long distance at my elephant, that I invoked the anger of the mahout for not firing soon enough. I forgot for the moment that if any one was in danger it was him and not me in the *howdah*. To return to the man-eater. Soon after the beat commenced I heard the tiger coming up towards my tree, and it remained within about sixty yards of me for some time, giving low growls. I could not, however, manage to see him. However, a few minutes afterwards, I saw him lying prone on the open side of a hill opposite. I would not fire at first, thinking he might go to another gun; but after some time I very wrongly determined to fire at him, believing he was bound to go out at the side of the beat and not in sight of the other guns. I afterwards learnt there were stops everywhere, and the tiger was bound to come close to one of the guns. I computed he was 200 yards off, and sighted my rifle accordingly. I missed him. We afterwards all agreed he was only 100 yards off, which gave me a good and valid excuse for the miss. The tiger then bolted into a patch of jungle, and the beaters all got up trees terribly frightened. Two of our party got on elephants, and he passed within twenty yards of them, giving each of them a right and left easy shot. All the shots missed him, and the tiger went away in sight of every one up another hill. The beaters said he was a regular "shaitan," and no bullet could hurt him. I

suppose this was said to let us down easy, but the State head shikari, Moti Singh, was terribly downcast about it, and I was horridly depressed in spirits also. However, two days afterwards we killed two tigers in one beat, and we got our good spirits back.

A common theory appears prevalent that a wounded tiger often turns man-eater, and lately in the columns of the *Pioneer*, I think, reference has been made to certain cases of wounded tigers having turned man-eaters in the Central Provinces. Wounded tigers often turn man-killers, but I have not obtained any evidence of their turning man-eaters. The difference is very great, except, perhaps, to the victim. A wounded tiger no doubt, until its wounds are healed, attacks every person who comes near to it. It does this not for the purpose of obtaining food, but because it is smarting under a painful wound, and it believes that the person approaching it is going to inflict another wound. Many instances can be quoted of wounded tigers killing persons approaching them after they have been wounded, and I need only mention the case of my friend the late Mr. G. L. Gibson, a member of our Society, who died here from wounds inflicted by a wounded tiger he was seeking for, and whilst he was examining the body of a native boy which he found killed by this wounded tiger. This is the chief danger of leaving a wounded tiger, as one knows that the first person who unfortunately comes near the place where the tiger may be lying down will undoubtedly be killed, and many sportsmen therefore very properly prefer to run considerable risk in killing a tiger they have wounded, rather than allow it to live and kill the first innocent person who may be so unfortunate as to come near it. Mr. Mulock writes me as follows, viz., "My theory is that if one member of a tiger family takes to 'the man quarry they all lose their fear of the biped and kill him 'when hungry. I have found this in one or two instances." I observe also that Mr. Saunderson in his book scouts the idea of man-eaters being mangy, and wonders how this idea became prevalent.

To sum up then, I have no particular theories, with one exception, to put before you as to man-eaters. The one theory I can advance is that the man-eater inherits this vice from its parents, or that the parent having previously learnt this vice from a parent or companion, teaches the cub to kill human beings, and such cubs, when grown up, teach the vice either to their own cubs or to their mates, and so the practice never dies out amongst the tigers of that district. In short I contend that, unlike the case of the poet, the

tiger is sometimes born a man-eater and sometimes made one. This theory will account for some districts never being entirely free from man-eaters.

In all cases it appears the man-eater shows greater cunning than usual. I have no evidence to show that the tiger turns man-eater for any particular reason, and I can offer no theory. There is abundant evidence to show that the man-eater is physically not different from the ordinary tiger, that age has nothing to do with the question, and that the theory about the manginess of his skin is mere fiction. There is evidence to show that districts in which the tiger has plenty of his natural food are just as much infested by man-eaters as in those districts where the natural food is less abundant. I am afraid my paper is of a mere negative character, and I leave it to some other members to evolve some theory for us on the subject.

*Statement showing the number of persons and animals killed by a man-eating tiger during the year 1888, in the territory of Bansda.*

Name of Village.	Name of person killed.	Age.	Sex.	Caste.	Date of death.	Animals killed.			REMARKS.
						Cows.	Bullocks.	Goats.	
Ambábári ...	Ardiá Bápudiá	30	Male .....	Kukná	15-12-88	1	...	...	The tiger was killed by Mr. R. Gilbert, Solicitor, Bombay, whereby the locality has been relieved of the terror.
Tádpádá .....	Gándá Kaliá	13	Do. ....	Koli.	18-12-88	...	...	...	
Waghái .....	1 Kesu Punio	60	Do. ....	Káthis	31-7-88	...	...	...	
	2 Tolia Bablia	45	Do. ....	Kukná.	22-10-88	...	...	...	
Sádad Devi...	.....	...	.....	.....	.....	5	6	...	
Wáti .....	.....	...	.....	.....	.....	4	1	...	
Khámblá .....	1 Jivla Kasa	37	Male .....	Wárii.	2-11-88	...	...	...	
	2 Radio Bhil	36	Do. ....	Koli.	28-1-88	...	...	...	
Sitápur .....	.....	...	.....	.....	.....	1	2	...	
Máhuvas .....	Bai Radgi.....	30	Female ...	Kukná	4-11-88	...	...	...	
Cháranwádá.	.....	...	.....	.....	.....	1	...	...	
Godhbári ...	.....	...	.....	.....	.....	...	2	...	
Kharjai .....	.....	...	.....	.....	.....	3	5	8	
Manpur .....	Budhia Náthá	50	Male .....	Káthia	12-11-88	...	1	2	
Dhákmal .....	.....	...	.....	.....	.....	1	2	7	
			7 Males.	.....	.....	16	19	17	
			1 Female.						
			8						

JHAVERBHAI NATHOOBHAI,

30th April 1889.

Devan of Bansda.

## THE CAMEL.

BY J. H. STEEL, A.V.D.

*(Read at the Society's Meeting on 10th July 1889.)*

IN dealing with a subject so large and so interesting as the camel, one hardly knows where to begin and where to leave off. It is extraordinary how various estimates have been formed of his value. Mahomed says of him that he is the greatest of all the blessings given by Allah to mankind; recent writers have represented him as ugly, spiteful, unreliable at work, stupidly phlegmatic, malodorous, and endowed with all the bad qualities under the sun; his very virtues, especially steady endurance of excessive toil, being attributed to want of sensibility and of even the faintest gleams of intelligence. The songs of the Arab of the desert are about the camel, as one of the most beautiful of created beings; the remarks of the British soldier and transport regimental officer about his baggage camels are not suited to ears polite! Who is right and who is wrong? We can have no hesitation in taking the side of the Arab. Still there is some excuse for the recent military opinion on this subject, because undoubtedly in the Soudan, along the Nile, and in Afghanistan camel transport has not been a success, and the poor beasts have died wholesale as a rule. The Russians in Central Asia, the French in Algeria, and, recently, the Italians in Massowah, have been quite as unsuccessful as we in our various campaigns as to keeping their camels in health and efficiency. Individual officers have solved the problem of how to keep camels at work, and prove them valuable on a campaign; but our troops have most certainly not been successful; however, surely, if overladen animals have not their saddles removed for a fortnight, we cannot wonder to find horrible sores on their backs; if animals remain ungroomed and tied up in lines or on the march for months together, we cannot wonder if they get mange in an aggravated form; and if animals get no food nor water for a week, we cannot wonder that they at last fall and die under their heavy burdens. To sum the matter up in a few words. If men have in war emergency suddenly to deal with an animal about which they know nothing whatsoever, the animal must not be blamed that the results are not altogether satisfactory. The knowledge of the camel possessed by the untravelled Briton is easily summed up. Firstly, he is certain that the animal is the "ship of the desert."

Secondly, that it has something to do with the eye of a needle. Thirdly (and most positively) it is a sort of travelling reservoir, consisting of inexhaustible water tanks and never needs to drink. Fourthly, it has a hump and long legs and neck. Finally, it is an uncanny brute of strange habits, suited only to the wandering Bedouin of the desert and the inimitable Barnum. When called on in the emergencies of service to take charge of camels, the principle an Englishman works on is to treat them as much as possible like the beast of burden, with which he is most familiar, the horse. Where this has been carried out thoroughly the results have been not unsatisfactory, for when groomed regularly the camel does not get mange, when properly saddled and loaded he does not get sore back, and when properly fed and watered he remains serviceable and does good work. It is when our soldier is given several camels to take care of, and is aided only by a lot of lazy, cowardly coolies, who know as little about a camel as he does, and have no intention of trying to do anything whatsoever for their pay, that the poor brute fails. The water-tank theory is an unfortunate one. Certainly a camel can go for seven days without water when properly cared for, but he ought to be watered once a day whenever possible, and stinted in this respect only in extreme emergency. There are pouches in his stomach, and they are frequently, after death, found to contain fluid; but that they are reservoirs pure and simple is doubtful; and it is very certain that the parched traveller who has to cut open his dying camel and obtain its accumulated stores of water, will obtain only a very little fluid, of a temperature of about 90° Fahr., a mawkish sub-acid flavour, and an unpleasant odour. It is evident that the time-honoured water-tank theory needs much modification, and is a dangerous one to insist on as a guide to practice during campaigns. As a matter of fact, the active and special services of camels in war and peace have been most extensive and valuable. That they have been associated with enormous losses is due to our ignorance and mismanagement, and is decidedly not the camel's fault. In Afghanistan, the Punjab, Sind, and Beluchistan, in Abyssinia, Egypt, and the Soudan, the camel has been essential to success of the operations; and it is certain that when we need to fight in China, Central Asia, Western Asia, Arabia, and North Africa the services of this extremely valuable baggage animal will be again called for. The camel is, I believe, under a cloud now in official estimation, but, like the Royal Marines, he has done good service on many an occasion, and is always

ready to do it again and sure to turn up when there is hard work going. Although the camel spits and grumbles when being loaded, though he makes unpleasant noises in the camp at night, and though he is generally considered unlovely in the extreme—and certainly no European nose can appreciate his odour—these unpleasant habits and conditions are to my mind more than redeemed by the undaunted and plucky manner in which he plods on with his load until he actually falls dead, by the stolid manner in which he remains quiet after a mortal wound until he rolls over on his side to die, and by the way in which he steadily plods on mile after mile under his heavy load until the halt is called, even for a march of considerably more than regulation length. The peace services of the camel are not less meritorious than his war services. His function as ship of the desert is gradually being taken away from him by the spread of railways, as in Rajputana, Sind, Central Asia, and Egypt, and we have historical evidence that his range has been limited to an extent since when the westward and eastward waves of the Mussulman invasion extended from Spain in the West to Southern India in the East. A few representatives remain in Spain, very few in Mysore, and in Europe practically the only camels are the stunted race of Pisa, which seems to have been introduced somewhat recently from Tripoli. I believe there are camels in Constantinople and European Turkey; I observe that General Gordon writes of them in Turkey. I noticed recently in the Royal Dublin Society's Museum a sowari camel on a real and antique Irish harp as its prominent decoration: how it came there I cannot surmise! I have somehow arrived at the impression that in Asiatic Russia, in the Caspian region, and Crimea, especially of European Russia, the range of the two-humped camel is becoming restricted by railway development. Expansion of range is taking place in the Southern States of America, where imported camels have done well and are multiplying rapidly, and in Australia, whither they have been imported from India, and where have been established breeding stations. It is considered that the camel will prove specially valuable in opening up Central Australia. In Mongolia, Western China, the Central Asian Desert, the Khanates, Afghanistan, Beluchistan, Persia, Asia Minor, Arabia, and the whole desert area of Northern and Central Africa the camel reigns supreme as a means of transport for goods and travellers. Tradition has it that the camel invaded Africa by way of the Isthmus of Suez; he has invaded America and Australia

by sea. It is reasonably surmised that the camel is decreasing in numbers; one of the Caliphs, for example, is credited with assembling 120,000 camels for a journey to Mecca. Here we are face to face with one of those difficulties constantly appearing before naturalists. Some allowance must be made for oriental exaggeration in the actual statement of numbers, and for unintentional multiplication in quality and quantity by *laudatoris temporis acti*, people who systematically run down the present in comparison with the past. The two-humped or Bactrian camel is much less frequent than the true dromedary or one-humped species. Palgrave, the celebrated traveller, is responsible for introducing serious confusion between the terms dromedary and camel. He has tried to restrict the former to the hygeen or running camel, known to us as sowari, and to make it out to be a distinct breed. This is not correct. The fact of the case is, that wheresoever camels are freely used and bred there are found well-bred light animals suited for sowari, and heavier, coarser bred individuals suited for baggage duties. According to the requirements of the locality the former or the latter predominate. There are very many local *varieties* of the camel, but only two species (*a*) the Southern, Arabian, one-humped camel, or true dromedary, and (*b*) the Northern, Bactrian, two-humped, or "true" camel. Where the two meet is the line of the Euphrates and Tigris; a few Bactrians have passed into Arabia, and I believe the two-humped camel is the one which has been imported into North America by the United States Government. In Northern Persia and Afghan-Turkestan the two species are found, and sometimes they cross and produce a hybrid. It is the one-humped camel which has invaded Australia, that of Bikanir in Rajputana, which shares with Jessalmir the honour of being the best places in India for camels. The Bactrian camel is very tolerant of cold, he works across snow on the Steppes, and is said to eat snow when he becomes thirsty; the dromedary is intolerant of cold, but will stand a remarkable amount of heat. Moisture in the air is probably the condition of climate of which the camel is least tolerant. No animal will travel better over sand, for which the peculiar structure of the foot, the deliberate action and the length of limb well suit him; mountainous passes are trying only to plain camels; even deep rivers with sandy bottoms can be forded by this animal, but a clay bottom and slippery soil proves very trying to him, especially under a heavy load, and deep ditches or cracks in the soil prove serious impedimenta, because camels



cannot do much in the way of jumping, except occasionally performing some awkward and grotesque gambols. One great desideratum in a transport animal is that he is capable of use in various ways. The camel can hardly be considered inferior in this respect. Besides sowari and pack work he carries small guns or will drag larger ones; he is used in high, peculiar, double-storey carriages (in the Punjab for example). General Gordon writes that they are used for ploughing in Turkey, and that they make excellent tramway animals! The products of camels are most useful—fuel, milk, excellent hair for shawls, cloths, and various fabrics, both coarse and fine, are obtained from the living animal; flesh-food, leather, bones, and various other useful substances from the dead. No part of the dead camel should go to waste. In camel countries these animals are used to afford amusement by combats, running races, or are trained to special performances, such as dancing. The adaptations of the camel to the desert which is its home are numerous and evident. Among others they are his height giving wide range of vision; his length of neck enabling him to reach far to the shrubs on either side of the track suited as food; ears very small, and nostrils capable of closure to keep out the sand; eyes prominent and protected by an overhanging upper lid, limiting vision upwards and guarding from too powerful rays of the sun; his horny pads to rest on when he lies in the hot sand; his peculiarly cushioned feet; his hump or reserve store of nutriment; his water reservoirs in connection with the stomach; his patient, plodding habits. It is a great mistake to consider the camel ugly. “Handsome is who handsome does” applies well in this case; but it is universally admitted that though a mangy dromedary in a show or transport lines is not handsome, a well kept camel in his native place is not ugly but quite the reverse! In the loneliness of the desert travellers recognise the camel and his movements not only as suitable, but sometimes as graceful, and even grand. We have this opinion in many well-known works of travel. It is well worth the while of any of my hearers who has not looked into the eye of a camel, to do so on the earliest possible occasion. I particularly admire its rich colour, its large size and clearness, and the stern aspect produced by the overhanging brow. Camels are much blamed for objecting to their packs being put on, but they are as a rule fully justified in doing so, for the loads are (as they have almost invariably been found in the past) uncomfortable

in the extreme, not unfrequently absolutely cruel. The peculiar arrangement of the camel's teeth makes his bite very formidable, and gives him a specially ferocious expression. He alone of ruminants has incisor teeth in the upper jaw, but in many other respects he is an aberrant ruminant, many of his anatomical details more resembling those of the horse than of the ox. Here I am in a position through the kindness of Mr. W. Home, of Jodhpore, and Mr. Phipson, to exhibit a most remarkable specimen—a horn taken from the forehead of an Indian camel. This may be a simple keratoid tumour accidentally occurring in this situation, but it gives scope for the general conclusion that the camel may, very occasionally, be found with a horn indicating his zoological affinities with other ruminants. This will not seem so far-fetched if we remember the undoubted fact that horses occasionally have frontal horns. The shape of skull of both horse and camel is such as would lead the zoologist at once to conclude that the animal was hornless. Even in cattle and sheep, when the temporal fossæ become very large, the horns are shed by a species of natural amputation. Charles Steel records having observed in Afghanistan that the Bactrian camels sometimes have an extra rudimentary toe, and so are specially sure-footed. The hump of the camel resembles that of the ox in structure but is much less muscular. The one-humped camel has a rudimentary second hump, so that this distinction is not so very considerable after all. In camels low in condition the hump almost disappears, the animals are described as "living on their humps."

Finally, I trust I have succeeded in establishing to the satisfaction of my hearers that the camel has been much and undeservedly maligned by Europeans, and that the Arab's estimate of him is more just and in accordance with the services he has rendered to mankind in the past and continues to render in the present. I can honestly say that my personal and professional contact with the camel in the course of journeys, on the line of march, in camp, and in cantonments, has impressed me with a high sense of the value of these long-suffering and most useful animals.

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## HOW TO FACILITATE THE STUDY OF BOTANY.

By G. CARSTENSEN, GRAD. HORT. R. D. C. AGE. (COPENHAGEN),

SUPERINTENDENT OF THE VICTORIA GARDENS, BOMBAY.

IN his "Address to Students of Botany," lately published in the Society's Journal, Mr. A. K. Nairne has attempted to indicate a way by which the study of Botany, or at least the knowledge of common Indian plants might be facilitated. Though the originator of the proposed system is no less a person than the celebrated philosopher, Jean Jacques Rousseau, the system as explained by the author of the address is very deficient, and a closer examination of its details will easily convince the botanist that such a limited definition of characteristic features, peculiar to species, genera and even Natural Orders, as those mentioned in the address, are likely to do much more harm than good, and give rise to serious mistakes. Thus the author remarks, that if a plant with this kind of flower (didynamous, or two-powered) is a tree, it most probably belongs to *Bignoniaceæ*, which very characteristic and distinct order he defines as often being large trees with ample leaves and large flowers, and often pod-like fruits, easily recognised by their vernacular names, but he omits to mention the frequent presence of pinnate (finned) leaves; the constant presence of the peculiar bilamellate (two-plated) stigma (scar), and frequently winged seeds, by which any plant belonging to this Order may be easily recognised. Following the author, at least one tree, which is very common in the Konkan, *Gmelina arborea*, except for its vernacular name, ought to belong to *Bignoniaceæ*, whereas it does not require more than ordinary botanical knowledge to recognise it as belonging to *Verbenaceæ*, of which Order the author simply says that it is not clearly defined, often trees and shrubs. Similar examples might be cited of other misleading statements too evident to avoid being noticed by the botanist. I have, however, no intention of criticising a paper attempting the praiseworthy object of facilitating the study of Botany, an object to which I hope by the present paper to contribute my humble share.

Regarding Botany as a science, and not only as a knowledge of names, a pleasant entertainment, or a feeble kind of sport, it may be said, as of all sciences, that a little knowledge is worse than no knowledge at all; and I cannot help considering it wrong to attempt to popularise it by considerably curtailing its general principles

and omitting important significant facts. Only the thoroughly instructed student will arrive to that climax of wisdom, where he with the Greek philosopher admits that he knows comparatively nothing, the only true inducement to an irresistible craving for further knowledge.

Now Botany is not a popular science, though it certainly deserves to be so. Only by the aid of this very interesting branch of Natural History do we learn to know the source of most of our articles of food, the raw materials of most industries, and the remedies for our diseases, &c., &c.; while a closer study of the details will show us the most wonderful organizations, the most perfect designs, and the most ingenious structures and contrivances, and nowhere, perhaps, is the greatness of creation more apparent and deeper impressed. The first great branch of Botany, is Descriptive Botany, or the knowledge of the exterior features of plants, which is the only branch of Botany that ever can be popular as a study, while the more intricate branches, known as anatomy and physiology, require the aid of the microscope, and a considerable knowledge of natural philosophy and chemistry to enable the student to comprehend their details; and must therefore necessarily for ever remain the property of a selected few. Descriptive or systematic Botany is doubtless the most important for all practical purposes, and no attempt should be left untried to facilitate the study of this knowledge. Among the numerous attempts which have been made with this object in view, none are more important than the arrangement or grouping of plants in definite orders or families, specified by peculiar features of the plant or parts of the plant. Here we must distinguish between artificial and natural systems, the first relating to a single peculiarity only, the last to the general features of plants. Among artificial systems, the only one which is important and has ever been popular is the Linnæan arrangement, in which the classes and orders are defined by the number and character of the sexual organs. It has the great advantage of being easily comprehended, and of being very useful for all practical purposes, but of late its popularity has greatly decreased, because it has the great drawback of leading to a superfluous knowledge of plants, without furthering science, and easily causing serious mistakes and leading to wrong conclusions. The Natural systems require a great deal more of study, and cannot be mastered without an almost perfect knowledge of Descriptive Botany.

The founder of the Natural arrangement of plants was a Frenchman, A. de Jussieu, and so clear and excellent was his system that the alterations made by De Caudolle, Eudlicher, Lindley, Bentham and Hooker, Baillon, &c., are merely a consequence of the enormously increased number of species now known to science as compared with Jussieu's period of life, or they are attempts at sub-division into more comprehensive groups, of which several, for instance that proposed by the great botanist, Professor Lindley, have proved too artificial, or to be founded on such minute details that they are unserviceable for practical purposes. The system now generally accepted, at least in the British possessions, is that laid down in Bentham and Hooker's *Genera Rusitorum*, but even yet at this period of advanced science, plants still exist which cannot easily be referred to any of the Natural Orders, without being sufficiently characteristic to justify the establishment of a new separate order, and it is probable that owing to the origin of the different forms of plants, by gradual alterations, as indicated by Darwin, there will always be found intermediate links and doubtful forms that will baffle any attempt at a complete classification. Even in such a large and well-defined class as *Dicotyledons* (two-seed-leaved), we find exceptions in the peculiar features, as the one-seed-leaved *Cylamen*, and in *Cuscuta*, without any seed-leaves at all.

All these attempts at facilitating the study of Botany are very useful for anybody acquainted with a preliminary knowledge of Botany, but do not give any assistance to the layman who intends pursuing the study, but to his or her disgust finds that before finding out the name of a plant or the order to which it belongs, he must work through a number of more or less unintelligible terms, which are too often a stumbling-block for the would-be student of Botany. My experience has also taught me that the study of Botany is far more popular in the northern countries of the Continent than in the far-stretching British possessions, and I cannot help thinking that this fact must be chiefly attributed to the difference in the botanical terminology. While the terms used in English works on Botany are too frequently quite unintelligible for the layman, because they are in most cases Anglicised Latin words, the terms used by German and Danish authors are generally easily comprehended, because they are translated into the mother-language, refer to objects of daily life, or are derived from the language itself. Though I am not an Englishman, I think I

have a sufficient knowledge of the language to rest assured of the possibility of substituting English, or at least English-sounding words, for the modern botanical terms, and in many cases I find that such terms really do exist, but are sparsely used.

Convinced as I am that a reform of the more unintelligible terms would serve the purpose of facilitating and popularising the study of Botany more than anything else, I venture to propose that the Botanical Committee of this Society be requested to revise the existing terminology and to substitute English and intelligible terms for the more unintelligible ones.

In order, however, to show that my project need not meet with serious obstacles, I shall take a few examples of commonly used terms and suggest English substitutes for them.

The Natural arrangement of plants consists of two large divisions—

Phanerogams, or “Flower-plants.”

Cryptogamous plants, or “Spore-plants.”

“Flower-plants” are again divided into—

Dicotyledons, or “Two-seed-leaved.”

Monocotyledons, or “One-seed leaved.”

The “Two-seed-leaved” in—

Angiosperms, or “Seed-vessel-plants.”

Gynosperms, or “Naked-seeded plants.”

The “Two-seed-leaved” are sub-divided into—

(a) Polypetalæ, Eleutheropetalæ, or “Free-crown leaved,”

with the groups—

Thalamifloræ, “Top-flowered.”

Discifloræ “Disc-flowered.”

Calycifloræ “Cup-flowered.”

(b) Gamopetalæ, “Entire crowned.”

(c) Apetalæ, “Crownless.”

These groups are again divided into Natural orders, too numerous to enumerate here, the Latin names of which in many cases might advantageously be substituted by existing or new English ones, as—

Ranunculaceæ by the “Crowfoot order”

Menispermaceæ „ “Moonseed order.”

Anonaceæ „ “Custard apple order.”

Cruciferae „ “Cross-flowered.”

Malvaceæ „ “Hollyhock order”

Sterculiaceæ „ “Flame-tree order.”

Tiliaceæ „ “Lindenbloom order.”

Sapindaceæ	by the	" Soap-tree order."
Leguminosæ	"	" Pod-fruited."
Rosaceæ	"	" Rose order."
Myrtaceæ	"	" Myrtle order."
Rubiaceæ	"	" Coffee-tree order."
Compositæ	"	" Head-flowered."
Apocynaceæ	"	" Twisted-flowered."
Asclepiaceæ	"	" Silk-seeded."
Boragineæ	"	" Rough-leaved."
Bignoniaceæ	"	" Gaping-flowered."
Scrophularineæ	"	" Mask-flowered."
Labiataæ	"	" Lip-flowered."
Acanthaceæ	"	" Shield-flowered."
Amaranthaceæ	"	" Cockscomb order."
Polygonaceæ	"	" Buckwheat order."
Euphorbiaceæ	"	" Milkwort order."
Urticaceæ	"	" Nettle order."
Amentaceæ	"	" Catkin-flowered."
Coniferæ	"	" Fir order."
Cycadeæ	"	" Cone-palms."
Aroideæ	"	" Spindle-flowered."
Cyperaceæ	"	" Half-grasses."
Gramineæ	"	" Grasses."
&c.	&c.	&c.

The Natural orders consist of genera, for which word I should substitute "forms," and these again of species or "kinds."

Regarding the details of the plants, the following short sketch may serve as an illustration of a revised terminology.

The complete flower consists of four different kinds of transformed leaves. The outer series or "ring" is the calyx, "the cup," formed of free or united sepals, "cup-leaves"; next comes the corolla, "crown," formed of free or united petals, "crown leaves"; the "cup" and "crown" together are called perianth, "floral cover," which is termed double when both cup and crown are present, single when one of either is absent, in which case it is either calycine "cup-like" or corolline, "crown-like." When the floral cover is entire, the lower part is called the tube, the upper part the limb, collar, which may be campanulate, "bell-shaped"; rotate, "wheel-shaped"; hypocrateriform, "saucer-shaped," &c., &c. Next comes the andræcium, the male organs, consisting of stamens, "dust bearers,"

which are generally composed of filaments, "dust-threads" and anthers, "dust-buds," containing one or two (rarely more) anther cells, "dust bags," filled with pollen, "dust." The innermost part of the flower contains the gynæcium, the female organs, consisting of pistils, "dust-channels," generally composed of an ovary, "fruit-bud," and a style ending in a stigma, "scar." The "fruit-bud" is formed of one or more carpels, "fruit-leaves," furnished with placentas, "egg-stools," to which the ovules, "eggs," are attached either directly or by a funicle, "egg-string," the point of attachment being termed hilum, umbilicus, "navel." The "fruit-bud" develops into fruit, of which a great many forms are known; a few of the more important are the legumen or "pod"; the lomentum, "jointed pod"; the follicle, "podling"; the siliqua, "double-pod"; the silicula, "short-pod"; the capsule, "burst-fruit"; the achene, "nutlet"; the samara, "wing fruit"; the carcerule, "split-fruit"; the pyxis, "lid-fruit"; the nut; the berry; the pepo, "gourd fruit"; the pome, "pip-fruit"; the cone; the strobilus, a scale-cone"; the serosis, "fruit mass"; the sycomus, "cup-fruit," &c., &c. The fruit contains seed, consisting of a testa, "skin"; a perisperm, "rind"; and frequently albumen, "seed-yolk," always enclosing the embryo, "germ," consisting of a radicle, "germ root"; cotyledons, "seed leaves"; and a plumule or gemmule "germ-bud."

Returning to the flower it will be seen that its different parts are inserted on a receptacle, "fruit seat," and according to the position of this, the flowers are termed hypogynous or inferior, "low seated"; perigynous, "middle-seated"; and epigynous or superior, "high-seated." The flower is either sessile, "sitting," or pedicellate, "stalked." The pedicels, "flower-stalks," spring directly from the stem or form part of an inflorescence, "flower-stand," which can assume a great variety of forms—the most important with "stalked" flowers, of which are—the raceme, "spray"; the corymb, "cluster-spray"; the panicle and thyrs, "bunch"; the umbel, "tassel"; the cyme, "fork," which may be dichotomous, "two-pronged"; trichotomous, "three-pronged"; or scorpioid or circinate, "coiled"; and then secund, "one-sided"; the fascicle, "cluster," &c. Among "flower-stands" with "sitting" flowers, the most important are the spike or ear; the amentum or catkin; the strobile, "scale-cone"; the spadix, "spindle"; the capitulum or head; the hypanthodium, "cup-flower"; and the glomerule "ball." The flowers are frequently



accompanied by small leaves, bracts, "shields"; and bracteoles, "shieldlets." The stalk of the "flower-stand" is termed peduncle, "flower-stem"; when rising from the ground, and not forming part of the stem, it is called scape. The flower-stand is often more or less enclosed in a spathe, "wrapper"; or an involucre, "skirt."

The leaves consist of the blade, the petiole or "leaf stalk," and sometimes the "sheath" and stipules, "leafings." The buds formed in the angle between the stem and the leaf are called axillary buds, "corner-buds." Leaves may be linear, lanceolate, "lancet-shaped"; elliptic, "oblong"; ovate, "egg-shaped"; cordate, "heart-shaped"; hastate, "spear-shaped"; cuneate, "wedge-shaped"; orbicular, "round"; ob-ovate, "reverse egg-shaped"; reniform, "kidney-shaped"; peltate, "shield-shaped," &c. &c.; entire, undulate, "wavy"; sinuate, "scalloped"; dentate, "toothed"; serrate, "saw-toothed"; crenate, "round-toothed"; lobed, laciniate, "jagged"; fimbriate, "fringed"; semi-pinnate or pinnate partite, "half-finned"; pinnate, "finned"; bi-pinnate, "double-finned"; palmate, "fan-shaped"; digitate, "fingered"; pedate, "foot-shaped," pedati-sect, "foot-fingered," &c., &c.

This is naturally only a short sketch, and only a few of the numerous botanical terms have been mentioned, but I should be very happy if the Society would give its support to a complete revision of all the existing botanical terms, and I have no doubt that such a step would lead to vastly increase the number of students of Botany, and in the end would materially further the progress of this unfortunately neglected science.

In conclusion, it may be remarked that such a revised terminology could not be advantageously used in purely scientific works, calculated to have a cosmopolitan distribution, but such works should be written in the Latin tongue, which for foreigners at least is not more difficult to understand than the existing English botanical terminology.

## AN INDIAN NATURALIST'S TRIP TO AUSTRALIA.

By SURGEON-MAJOR K. R. KIRTIKAR.

To a student of Botany and Zoology the vast island-continent of Australia affords an interminable field of the most interesting and

instructive research, whether it be from the abundance of Natural<sup>1</sup> History objects, or from their varied character and striking contrast as compared with the Flora and Fauna of this country. India with all its richness and variety of vegetation has nothing to compare with the Eucalypts and Acacias of Australia. One would hardly think, as you approach King George's Sound by steamer, and cast your eye now hungering to see land, along the barren coast of Western Australia, that what appears but a dry sand-bank or a sand-hill, is covered over with vegetation which, though it may be scanty here, and merely scrub-like there, affords the student of nature as rich a subject in foliage and timber as it is varied in the forms, colour and beauty of its flower, fruit and seed.

Even the voyage itself to Australia is full of interest to a marine zoologist. Soon after you cross the Equator you see the Flying fish (*Exocetus volitans*) jumping up in the air from the surface of the disturbed water as the steamer cuts her way across it. That they have no real power of flying is an undisputed fact, for—says Dr. George Bennett, that veteran naturalist, who is now in the eighty-third year of his age, and who was one of the earliest scientific explorers of New South Wales—fishes of the so-called flying genus (*Exocetus*) have “no power of elevating themselves in the air after having left their native element; for on watching them, I have seen them fall much below the elevation at which they originally rose from the water, but never, in any instance, could I observe them rise from the height at which they first sprung.” They are, however, able to maintain brief temporary flights in the air, says Magnin, a French writer, through the extraordinary size of their membranous pectoral fins. My own idea is that they quit the water only when they are frightened by the advance of a steamer, or to escape the maws of sharks and other larger piscivorous fishes or sea-faring birds, such as the gulls and albatrosses that pounce upon them with lightning speed. They hardly rise more than from fifteen to eighteen feet above the level of the water, and the height of their leap depends entirely upon the force of their first spring, which having reached, they fall by their own weight, without the slightest power of maintaining themselves in air. They fall and rise again, and go on doing so by the hundred and thousand for a considerable distance. In the tropical sun as they rise from the silvery crest of the deep blue wave thrown into ample folds by the advancing prow of the ship, their silver blue wings and

glittering bodies present a spectacle which is charming to the eye, and affords occupation to an idle mind on board a steamer.

The porpoise is another denizen of the Indian and Southern Ocean which attracts our attention. The graceful rise and fall of these marine creatures, as they run a race with the advancing steamer, has the appearance of child-like mirth and frolic, which create an interest for their movements in their spectators and make up for their squalid and utterly uninviting appearance. For miles together in pairs, or singly by the dozen or by the score, these heavy-looking cetaceans rise and sink with an ease which is surprising. Now alongside of the vessel, now under the keel, rushing from one side to the other, they cross the path of the ship with a rapidity which is marvellous in the extreme, evidently conscious of the gazer's eye and bent upon eluding it while frolicking about the ship.

As we enter the "Heads" and anchor at Port Melbourne in the vicinity of the P. & O. Co.'s pier jutting right into deep water, we see innumerable *Medusæ*, the living seaweeds as a French writer calls them—

"With the freedom and the motion  
With the roll and roar of the ocean."

These magnificent opal globes, or bell-shaped discs of soft jelly are beyond description. They have to be seen to be admired. They are better seen and watched when the vessel is at a stand-still, and when they come in search of prey close to the sides of the vessel working their way up and down with the alternate contraction and expansion of their globular bodies, and rendering their manœuvres graceful by a similar movement of their numerous frills and prehensile tentacles, which at once mark them out as some of the most charming and elegant objects of oceanic creation.

There are besides innumerable sparkling animalcules visible at night, especially at the side of our vessel, causing the phosphorescent appearance which has for many years been the puzzle, not only of ordinary spectators, but even of accomplished natural historians. It was at one time considered that oceanic phosphorescence was due to the putrefaction of dead and decaying fish. But we know that the conditions of death and decay are not essential to the production of phosphorescence. We know that the common glowworm or fire-fly of our rainy season is a living entity emitting light on a dark night, when *living* and in a state of perfect health. That phosphorescence is due

partly to the decay of phosphorous-holding fish is a fact, but it does not sufficiently account for the entire oceanic phenomenon. That marine zoophytes of extremely small size have their share in the production of this phenomenon, is a fact beyond dispute.

Being more of a botanist than zoologist, to me the floating vegetable seaweeds had more charm than the phosphorescent zoophyte, or the living seaweeds, the flying fish or the graceful porpoise.

In the Bight, and at the Heads and in Port Philip, the appearance of floating *Sargassum* and *Fucus Bacciferus* looked tempting as I admired long trails of them in the crystal blue of the tranquil sea. Secure they lay in their position. My predaceous hand was beyond their reach, or rather they were beyond the reach of my onslaught. Nothing could stop the onward course of the steamer, nor even slacken her speed for the purpose of marine-botanizing on the part of a solitary individual like myself.

*Phyllospora comosa* is a seaweed of extraordinary length and beauty, as it is seen floating several yards with the beautiful sunshine heightening its rich olive color. The long tape-like leaf, flat and mucilaginous when obtained from the shore, and the olive-shaped bladders with leafy expansions at the top, render the plant an object of attraction. But when you are on board a steamer there is not the slightest chance of your getting hold of these plants. They are a vexation. So on 26th December 1888, I left them in their glory undisturbed, and set foot on the *terra firma* of Melbourne to botanize in more generous and approachable regions. To an inhabitant of India, accustomed to the rich and luxurious vegetation of the Konkan, at first sight Australia appears a barren land—a dead level covered here and there with scrubby-trees which continuous drought has almost starved unto death. Often you see however tall and magnificent trees on some stratified sand stone reaching down to the ocean-strand, unaffected by the battering and beating of the ruffled waves of the salt water. The foliage, whether in the bush or in the forest, among the scrubs or among the vivid fern-gullies, varies considerably from bright dark green to dull greyish hue. Fifty-three years ago when Charles Darwin visited Australia during his voyage round the world in H. M. S. "Beagle," which laid the foundation of his future fame, and which gave to the scientific student an enormous amount of information in Natural History, this venerable scientist made a

remark in his journal which struck me as an instance of Darwin's powers of observation. With reference to the vegetation of New South Wales, he says "the trees mostly have their leaves placed in a vertical instead of as in Europe"—and I may add as in India—"in a nearly horizontal position." Darwin further observes that "the foliage is scanty and of a peculiar pale-green tint without gloss." I do not know about the foliage being scanty as a rule, but there is no doubt that in a majority of real Australian trees the leaves are tough in texture, of a peculiar dull greyish hue, without gloss and perpendicular. The trees are mostly small-leaved, and if large, much dissected marginally, thus depriving them, however large they may be, of all appearance of shade or shelter. The result, as Darwin justly observes, is that the woods appear light and shadowless, and are no comfort to the traveller seeking shelter from the rays of a scorching sun. This particular appearance of the foliage of Australian plants, however, renders the study far more interesting, and invests them with a charm which would else be wanting. Compared with this often desolate looking scrub, this pale-green small-leaved bush, an umbrageous Banyan and peepul, or our mango and mowrah, or our sâg and jack tree shine at an advantage. But the chief vegetation of Australia is essentially made up of hundreds of the blue gums and red gums that go under the generic name of the Eucalypts. The genus *Acaciæ*, of which Baron Sir Ferdinand von Mueller—the greatest living authority on Australian Botany, and indeed one of the readiest and most accomplished Botanic experts in the world—counts three hundred well-marked species in Australia, is by far the largest in the Flora of Victoria. Apart from its being cultivated for ornamental purposes, it has its technological value. The timber of many of the *Acacias* is worthy of forest-culture. The Australian blackwood (*Acacia melanoxylon*) is well known among timber merchants as one possessing great lateral strength. "It is largely used," says Mr. J. E. Brown in his *Forest Flora of South Australia* (Pt. VIII., page 37,) "in the construction of furniture of all kinds, house decorations, railway carriages, boat-building, casks, billiard tables, pianofortes, veneers and turnery." The value of the *Acacias* for tanning purposes is very great. Black wattle, for instance (*Acacia decurrens*, var. *mollissima*), yields from 30 to 54 per cent of tannin, which is said to go as far as three and a half times its weight of oak-bark. (*Haldane*.) Baron Sir Ferd.

von Mueller says one pound and a half of black-wattle bark goes as far as five pounds of oak-bark for tanning purposes. The Acacias are very quick growers, and thrive in mild climates. It would not be, in my opinion, a fruitless endeavour to experiment on the growth of these interesting and technologically highly useful plants in the milder regions of India, where there is neither much moisture nor dryness in the air, and where the climate is more equable and favourable to the growth of vegetation which partakes of a semi-tropical character. The blackwood tree is being extensively cultivated for its timber and bark in Portugal. The Acacias of Australia to my mind appear to be of much practical interest, inasmuch as in India we have several varieties, such as the *Acacia catechu*, *Acacia arabica*, *Acacia concinna*, *Acacia procera*, yielding gum, tannin and useful timber. Some of the Australian Acacias are very gay and lovely, and some sweet-scented. The most attractive object throughout the whole range of Australian vegetation, however, is the interminable genus *Eucalyptus*. Its height in proportion to the period of its growth is simply marvellous. It is unparalleled, says the Baron von Mueller, in the celerity of its growth among hard-wood trees. Tall and erect, towering high in air, often with a tender-looking stem and bluish foliage, these trees are among the first to attract a traveller's attention. When in flower, they are exceedingly pretty, especially those with rich crimson and scarlet bunches of flowers. The gum trees are not all of uniform appearance as regard their central stocks and stems. Some shed their barks annually, and are thus named the "stringy bark." Large masses of this bark are seen sometimes peeling off from the stalk and hanging the whole length of it. I have here a specimen of the bark of *Melaleuca genistifolia*, belonging to the natural order Myrtaceæ, to which the *Eucalyptus* genus belongs. It is called the paper bark tree. It will give you an idea how microscopically fine the bark layers are. It was taken from the Melbourne Botanical Gardens at the kind suggestion of Mr. Guilfoyle, the accomplished Director. To Mr. Guilfoyle's generosity this Society should feel particularly indebted when I say that the specimen papers and fibres which are placed before you to-day, and presented by me to the Society, are the unstinted gift of Mr. Guilfoyle.

But let me proceed to further describe the Flora. The Myrtaceous plants are numerous in Australia. The *Melaleucas* and *Callistemons* are very graceful when in blossom and even out of

blossom. The brilliant dense crimson cylindrical spikes of the latter are particularly charming and look very much like the flower heads of the Banksias. There are four orders which are exclusively Australian throughout the whole vegetable kingdom, *viz.*, the Myoporinæ, the Epiacridæ, the Goodeniaceæ, and the Candollaceæ. Of these the Myoporinæ, says Baron von Mueller, "are remarkable for their foliage and delicately-tinted and richly-marked flowers which are to be seen adorning the scrubs and garden shrubberies from year's end to year's end." The natural orders Proteaceæ and Pittosporæ are well represented in Australia. The Pittosporum is a genus of very handsome evergreens, either as tender shrubs or small and slender trees. It is one of the rare scented class of plants seen in Australia. The flowers of *Pittosporum undulatum*, which is known as the Victorian laurel, and of *Pittosporum rhombifolium*, yield a perfume which is as rich and delicate as that of the Jasmine. Their timber is also of high commercial value. *Pittosporum phillyræoides* is said to be one of the most graceful members of South Australian flora. Its existence in sterile places, often a solitary entity in a barren plain, affords an illustration of how trees grow in even the most neglected spots and flourish in foliage and flowers. Of the Proteaceæ, *Stenocarpus sinuatus*, which is known as the Queensland Tulip tree, is a very handsome tree, often reaching the height of a hundred feet. Its flowers are beautifully scarlet and radiately arranged in thick clusters. I saw this tree in blossom in February in the Sydney Botanical Gardens. Its wood is beautifully grained and very durable, says Mr. Guilfoyle. *Greville robusta*, a tree introduced into Bombay, is a native of Australia. I have seen it for years growing here. But it does not appear to be so quick of growth as in its own home. It is called the "Silky Oak." It is productive of substantial timber, well worthy of the consideration of our foresters, apart from the highly perfumed yellow and orange comb-shaped masses of flowers it produces. It often grows as high as a hundred feet. *Banksia*, or the Victorian Honeysuckle, and *Hakea*, are some of the other representatives of the Proteaceæ. They have numerous species all over the island continent. They inhabit sandy soil, or are utilized as hedge plants. Their quaint flowers, in cylindrical dense spikes and seed vessel, are their sole points of interest. *Xylomelum pyriform*, or the Wooden Pear of Australia, belongs to this order. You are, perhaps, imagining that this Wooden Pear is in any way allied to the soft delicious

pear which is the postprandial luxury of an English table. Nothing like it, except in the bare shape. The Wooden Pear is as different from the reality as the betelnut is from the cherry. I have a specimen of it here. It is a typical specimen of a simple fruit formed of one carpel. It has a beautifully winged seed, which can be seen through the half-dehiscid carpel. There are two representatives of the Sterculaceæ, viz., the Flame tree and the Bottle tree, which are worthy of notice. The Bottle tree is botanically either the plant called *Sterculia diversifolia*, or *Sterculia rupestris*, and is really the wonder of Australia. It is swollen at the trunk immediately above the root, as it springs from the ground, in the shape of a pumpkin or bottle, and is known to the natives as *Kurra jong*, a name given to another plant. The tree contains large quantities of mucilage, which exists between the wood and inner bark, and is sweet and edible. It is a blessing to men as well as to cattle, as it is found to be nutritious. The latter use it when pasture fails as fodder. "The bark," says Guilfoyle, "when macerated in water produces a lace-like bast, which has been converted into ropes, cordage, and coarse paper." The Australian Flame-tree, *Sterculia acerifolium*, may be considered a forest beauty when in full blossom. Before it blossoms it sheds its leaves. When the flowers open on its numerous irregularly shaped branches, its stately stem is adorned from top to foot with rich scarlet trumpet-shaped flowers, with a tinge of bright orange here and there, which gives the beautiful tree the appearance of being all aflame. The appearance is very similar to that of our own Palas or *Butea frondosa* in the Konkan when it is in flower. Australia is rich in Orchids, both terrestrial and epiphytal. Mr. Fitzgerald, of Sydney, has made a special study of them, and I here exhibit his beautiful plates, which are the result of the earnest life-work of an accomplished botanist and artist. Some of the orchids are said to be of exceedingly attractive fragrance, as, for instance, *Thelymitra* and *Caladenia*. Let me not forget to mention that the sweetest scented Australian flower belongs to the natural order Rutaceæ, and is called *Boronia megastigma*, a native of Western Australia. What a contrast to the horribly offensive Satap (*Ruta angustifolia*) of the same order! The genus *Boronia* is well represented in the Victorian indigenous flora, in the species named *B. pinnata*, bearing beautiful crimson flowers; but the other species are chiefly confined to the Western Coast and New South Wales. The Tree-Ferns form a specially interesting feature of Australian vegetation, generally



varying from twenty to thirty feet, and often attaining a height over eighty feet. There is not a prettier sight in Victoria, and indeed the whole of Australasia, than what are called the Fern-gullies, which abound in these beautiful feathery palm-like ferns, waving their fronds in mid-air with all the gorgeous green a mild sky and moderately humid air engenders. *Dicksonia antarctica* and *Alsophila Australis* are the two most common varieties of Tree-Ferns in Victoria. The former grows in shady places where there is abundance of running water, and is known as the Woolly tree-fern; the latter is called the mountain or hill tree-fern, and is seen in more open spaces, such as the ridges of hills, where it displays its beautiful fronds to the sun direct. *Todea barbara* is another remarkable fern which attracts our attention in the fern-gullies of Victoria. It seldom grows more than four or five feet high, and has a short thick stem about as many feet in circumference, frequently weighing as many as fourteen or fifteen hundredweights! About the end of January last, in the hottest time of the year in Australia, I paid a visit to Fernshaw, one of the prettiest fern-gullies—I should say one of the prettiest and yet grandest fern-forests of Victoria. It was one mass of delicious gorgeous green with the shady beech and the blue gum towering in mid-air, the lovely silver wattle, the modest musk, and the stately cotton-wood—the largest composite ever seen anywhere, adding to the scene a variety of foliage, thus making it all the more attractive to the eye, and heightening the effect of the valley as a whole. All these trees fringing and filling fully the magnificent hill from the Black Spur at the top to the crystal pool at the foot of the valley, set off the emerald fronds of the Woolly tree-fern (*Dicksonia*) in the most striking manner. The stream of water is perennial, crystal clear to the eye cool to the touch, and delicious to the taste. Its perpetual music imparts a softness to the sylvan solitude, which else might be awful; its constant fresh accession of undefiled water to the valley enlivens the scene and brightens its velvet-verdure, which constitutes the sole charm of this happy and secluded valley within easy reach of Victorian travellers. In walking through this beautiful sequestered spot, damp and covered with dead and decaying foliage, the traveller must take care that his lower extremities do not get attacked by minute leeches, whose hair-like bodies often escape the unsuspecting eye and even elude the cautiousness of the wary wanderer of these quiet regions. The *Dicksonia* has its own parasites and epiphytes in the shape of numerous fungi, mosses, club mosses, and smaller ferns,

among which latter *Polypodium scandens* and *Hymenophyllum, Tunbridgense*, are prominent. It may be mentioned that in the gardens of Australia the *Magnolia grandiflora* and the *Lilium grandiflorum* flower and thrive to perfection, though only introduced recently into the Island continent. The purple variety of the *Magnolia* is a garden beauty. With its rich golden crowns of flowers, rendered all the more visible by the purple tint of the large widely open petals, the plant is strikingly attractive.

(*To be continued.*)

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## MISCELLANEOUS.

### TWO CURIOUS INSTANCES OF MIMICRY.

Two remarkable instances of mimicry have come under my notice within the last few weeks, one by a bird, the other in an insect. I will give them in the order in which I have mentioned them.

At p. 150 of the 4th vol. of this Journal, Mr. Morris published an account of a talking "Madras Bulbul" (*Pycnonotus hamorrhous*), which in captivity learned to talk by mimicing a parrot with which it associated. A few days before the meeting of the Society at which that paper was read by the Honorary Secretary, I happened to pass his house, and in a small acacia tree in his compound, which overhangs the road about 10 yards below his lower gate, I heard the well-known note of the "Coppersmith" (*Xantholema Indica*), but though the leaves were so small and scanty that I could see through the tree on all sides, the only bird I could see in it was a Madras bulbul, who on my looking up greeted me with his usual chuckle. I called to mind the well-known powers of concealment enjoyed by the coppersmith, and his ventriloquial skill. But seeing how ill-adapted his present perch was for the successful employment of his usual artifices, I determined this once at least to circumvent them. As I approached the tree I heard the coppersmith and the bulbul apparently conducting an animated dialogue, in which the "took-took" of the one was spiritedly answered by the "chuckle-chuck" of the other. Still I could see only the bulbul. It was raining slightly, and that reminded me that it was an unusual time of the year for the coppersmith to be so loud and persistent in his call, for the "took-took," so familiar during the hot weather, generally becomes less frequent and more feeble during the rains. I got close under the tree, and though I could see every twig in it, and there was the bulbul hopping about, and chuckling, some four feet from my head, and though the coppersmith still kept vociferating "took-took," apparently just behind him, yet not a feather could I see of any bird but the bulbul. Determined to have a sight of the coppersmith that was hiding itself so cleverly, I threw up a good sized stone into the tree, when out flew—the bulbul alone with a derisive chuckle, into the opposite garden, where I presently heard the dialogue going on again as if it had never been interrupted.

In the instance of the Madras bulbul recorded by Mr. Morris, the mimicry was the result of education. The instance of mimicry by a wild bird which Mr. Aitken gave at page 30 of the 1st volume of this Journal was by the allied but perfectly distinct "green bulbul" (*Phyllornis Malabaricus* or *Jerdoni*). I have not before heard of an instance of a wild Madras bulbul imitating the natural notes of his jungle associates. But that *Pycnonotus hamorrhous* has the faculty of mimicry is clear from Mr. Morris's paper. As in his instance the development of that faculty was apparently induced by the effort to repeat the constantly reiterated utterances of a companion bird, so in mine it would seem that the note incessantly sounded by a neighbour all through the hot weather had taken such a hold of the bulbul's mind that he was driven almost unconsciously to repeat it. The maddening monotony of that "took-took" keeping him awake after tiffin on hot Sunday afternoons may well have so acted on the poor bulbul's nerves or brain as to drive him to emit a similar sound, and it is hard to see for what other reason he should have attempted it in a wild state, with none to instruct or applaud him, and with a far more pleasing note of his own.

My second instance of mimicry must be of very frequent occurrence, for it is one of natural protective mimicry in the life history of every individual larva and pupa of a common species of butterfly. But as I have never yet seen any description of it, I think it may possibly not yet have come under the observation of any entomologist, and as it is certainly curious and interesting, I venture to offer a description of it.

On the 1st August I found on the leaves of a sweet lime tree in my garden four small caterpillars lately hatched. Feeding, as they did, on the upper side of the leaf, they were of course fully exposed to the sight of every passing bird. Being moreover of slow and sluggish habits, these caterpillars, so exposed to the sight of their enemies, were driven to artifice to elude their observation. They adopted the unsavoury one of pretending to be bird-droppings. In every instance the imitation was so exact that at the distance of a foot and a half I found it impossible to tell the caterpillar from a bit of the solid excrement of some small bird. It was bluntly rounded at the head end, tapering rather suddenly towards the tail, of a dark gray colour, with an irregular broadish band of dirty white running diagonally across the body. It retained this appearance so long as it remained of a size to carry on the deception successfully, but when about  $\frac{3}{4}$  in. in length, and too large to hope to be any longer mistaken for what it at first pretended to be, it began to imitate the tree on which it was feeding. Here again the imitation was most exact. The back arched up, like a folded leaf. The dark gray turned to the dark green of the foliage, and the single broad white band became two much contracted markings of brown delicately streaked with yellow, like the bark of the twigs, while a still narrower line of the same appeared transversely across the back, just above the head. The green continued to expand and the brown to contract, till the caterpillar was about an inch and a half in length, when it was of a beautiful shaded green all over its upper side, and pink to ash colour beneath. It then attached itself firmly by the tail end to a twig with its head upwards, at an angle of about  $30^\circ$ , steadied itself by two almost invisible gossamer threads from its head to another twig above, and in that position assumed its chrysalis

form in the shape of a curved green leaf, which it imitated so exactly that I had some difficulty in finding it in the sprig in which I knew it to be.

The first of these larvæ to assume the pupa form did so on the 9th August. Two others when on the point of following its example a few days later, unfortunately developed suicidal tendencies, and drowned themselves in the water in which the stalks of their lime sprigs were immersed. The fourth assumed the chrysalis form on the 28th August. The one who entered on his pupa-hood on the 11th August emerged a perfect imago on the 20th, a male of the species *Papilio Pammon*. Despite the habits acquired in youth, it would appear that his long course of deception then ended, for he was like nothing else that I know. But, had *he* been *she*, it would have continued to the end of life. For, whether it is to protect herself from the attacks of some voracious foe with a special liking for the flavour of *Papilio Pammon*, or from a feminine vanity which leads her to prefer the brilliant colours of other species to the sober-suited livery affected by the males of her own, or owing to the natural duplicity of the wily sex born to deceive, or only because Mr. P. likes to see his wife brightly dressed, I know not (I hope the last is the true reason), yet certain it is, as pointed out by Col. Swinhoe in an interesting lecture on Mimicry in Butterflies for Protection, printed at p. 169 of the 2nd vol. of this Journal, "the female of *Papilio Pammon* mimics two species, *Papilio Diphilus* and *Papilio Hector*." Which of these, if either, will be mimicked by the imago I expect to result from my now sole surviving pupa, I am anxiously waiting to see.\*

W. E. HART.

Bombay, 29th Aug. 1889.

\* The imago appeared on 7th September, a female of the *Diphilus* type.

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## ZOOLOGICAL NOTES.

IN the month of June 1888, I was standing one morning in the porch of my thouse, when my attention was attracted by a large dragon-fly of a metallic blue colour, about  $2\frac{1}{2}$  inches long, and with an extremely neat figure, who was cruising backwards and forwards in the porch in an earnest manner that seemed to show he had some special object in view. Suddenly he alighted at the entrance of a small hole in the gravel, and began to dig vigorously, sending the dust in small showers behind him. I watched him with great attention, and, after the lapse of about half a minute, when the dragon-fly was head and shoulders down the hole, a large and very fat cricket emerged like a bolted rabbit, and sprang several feet into the air. Then ensued a brisk contest of bounds and darts, the cricket springing from side to side and up and down, and the dragon-fly darting at him the moment he alighted. It was long odds on the dragon-fly for the cricket was too fat to last, and his springs became slower and lower, till at last his enemy succeeded in pinning him by the neck. He appeared to bite the cricket, who, after a struggle or two, turned over on his back and lay motionless, either dead, or

temporarily senseless. The dragon-fly then, without any hesitation, seized him by the hind legs, dragged him rapidly to the hole out of which he had dug him, entered himself, and pulled the cricket in after him, and then, emerging, scratched some sand over the hole and flew away. Time for the whole transaction, say, three minutes.

The cricket was of the large fat kind that keep up a continual singing in a tree or house porch. The noise is peculiar, as it is difficult to tell from what spot it comes, and it sometimes has almost a deafening effect on the ears if listened to for some time. I have most frequently heard these crickets in hill jungles in the hot weather, but I do not know their scientific name.

I do not find any mention of a dragon-fly such as I describe in "Tribes on my Frontier," nor have I ever heard of a case in which a large cricket was dug out of his home, only to be killed and then buried in it. But was it his home? or was it the home of the dragon-fly into which he had got by mistake? If the former, why did the dragon-fly put him back again? or, if the latter, why did the cricket ever go into the house of so formidable an enemy? I conclude that the cricket was in his own home, and, in that case Irish evictions and moonlighters are nothing to what he had to endure, for he was first evicted, then chased and killed, and then buried beneath his own hearth-stone.

In any case the sight was a most curious one, and I should be glad to have a scientific explanation of it.

E. GILES.

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## CORRESPONDENCE.

### WILD BUFFALO.

*To the Editor, Bombay Natural History Society's Journal.*

DEAR SIR,—Mr. Littledale's derivation (see Journal No. 2, page 153,) is ingenious even if it is not quite correct.

I think, as far as I can gather, the word "Urnah" not "Arna" comes down from Assam and those parts, and is not Hindustani at all. My authority for this is Baldwyn, who frequently uses the word "urnah" as if it were in common use in the parts of which he is writing, *viz.*, Jeypore and the Lowqua lake.

I was this year in the Central Provinces, and came across several herds of buffalo. The natives, however, did not even understand the word "Arna" or "Urnah," but called them indifferently with the bison "Bim bhainsa," "Jungle bhainsa," and the Gonds "Pera Mao." The word "Gaur," whenever used, of course referred to "Garæus Gaurus," which were to be found in the same jungles.

In Sind and the Punjab the word "darkhat" for "darakht" is not uncommon, as well as many other Provincialisms, as "nuggee" for "nuzdeekh" (near). "Nuklau" for "Luknau." In the Central Provinces the town of Warora is called by every one there Baroda."—I am, &c.,

W. ST. JOHN RICHARDSON,

Capt. B. S. C.

## PROCEEDINGS OF THE SOCIETY.

## PROCEEDINGS OF THE MEETING HELD ON 10TH JULY 1889.

THE usual monthly meeting of this Society took place on Wednesday, the 10th July 1889, and was very largely attended, about 80 members being present. Dr. G. A. Maconachie presided.

The following gentlemen were elected members of the Society:—Lieut. R. P. Monk, Mr. V. B. F. Bayley, Miss Macdonald, M.D., Mr. George K. Wasey, Mr. H. C. Wright, Mr. H. M. Gibbs, Capt. G. M. Porter, R.E., Mr. T. E. Lovell, Lieut. W. S. Mangles, Mr. Ruttonji T. Furdunji Parak, Mr. Anthony P. Menezes, Capt. G. E. Hyde-Cates, Mr. I. O'Callaghan.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's Museum:—

## CONTRIBUTIONS DURING MAY AND JUNE.

Contributions.	Description.	Contributor.
1 Chameleon (alive).....	Chameleo vulgaris .....	Mrs. Aston.
1 Common Kangaroo .....	Macropus major .....	By exchange, thro' Dr. Kirtikar, with the Melbourne Museum.
2 Red Kangaroos .. .....	Osphranter rufus.....	
1 Duck-billed Platypus ...	Ornithorhynchus p a r a - doxurus.	
1 Vampire Bat .....	Pteropus poliocephalus .....	
1 Ring-tailed Opossum ...	Phalangista viverrina .....	Mrs. Skinner.
2 Sooty Kangaroos .. .....	Macropus fuliginosus .....	
1 Victorian Wombat .....	Phascalomys platyrhinus ...	
1 Porcupine Ant Eater ...	Echidna hystrix .....	
123 Stuffed Birds.....	Australian .....	Do.
99 Beetles .....	Australian .. .....	
3 Whydah Birds (alive) ...	Embresia paradisea.....	Mr. H. W. Searle.
A number of Waxbills (alive)	From Mozambique .....	
4 Robber Crabs (alive) ...	Birgus latro .....	Do.
4 Young Turtles (alive) ...	Chelonia virgata .....	Capt. Carpenter, R.N.
2 Coral Sponges .....	Carteris-spongia lammelosa..	Capt. G. E. Briggs.
3 Chameleons (alive) .....	Chameleo vulgaris .....	Mr. E. H. Aitken.
A quantity of Bats .....	From Carwar .....	Capt. Coleridge
A Black Bear (alive) ...	Ursus labiatus.....	Mr. E. H. Elsworth.
1 Crow's Nest .....	Made of Telegraph Wire ...	Dr. Alcock.
Crabs from the Orissa Coast.	Hippa asiatica .....	Mr. E. C. K. Ollivant, C.S.
10 Young Crocodiles (alive)	Crocodilus palustris .....	Do.
A number of Crocodiles' Eggs.		
1 Snake .....	Dipsas ceylonensis .. .....	Col. F. W. Major.
1 Kingfisher .. .....	Alcedo bengalensis.....	Mrs. Middleton.
1 Pied Cuckoo .....	Coccytes jacobinus.....	Do.
1 Young Crocodile .....	Crocodilus palustris .....	Mr. Rustomjee Hormarjee.
3 Bird-Eating Spiders ...	Mygale sp. ... ..	Rev. J. Mayr, S.J.
1 Tree Snake (alive) .....	Passerita mycterizans .....	Rev. F. Dreckmann, S.J.
1 Panther Cub (alive).....	Felis pardus.....	Mr. J. D. Inverarity.
1 Young Crocodile .....	From Asirgurl .....	Mr. B. H. Light.
1 Chameleon (alive).....	From Aden .. .....	Dr. Monks.
A quantity of Insects .....	From Raipore, C. P. ....	Mr. J. A. Betham.
1 Coppersmith's Nest .....	Xantholcema hæmacephala..	Mr. Charles Douglas.
1 Chameleon (alive) .....	Chameleo vulgaris .....	Shrivlal Motiram, Khan Sahab.
1 Sea Snake (alive) .....	Pelamis bicolor .....	Mr. A. Abercrombie.
1 Snake .....	Ptyas mucosus.....	Mr. J. Warden.

Contributions.	Description.	Contributor.
1 Toddy Cat (alive).....	<i>Paradoxurus musanga</i> .....	Mr. H. E. James, C S.
1 Japanese Spider-Crab ...	<i>Inachus kæmpferi</i> .....	Purchased.
1 Snow Panther's Skull and Skin.	<i>Felis uncia</i> .....	Do.
A quantity of Corals, Fish, and Marine Animals.	From Alibag.....	Mr. W. F. Sinclair, C.S.
1 Panther's Skull.....	<i>Felis pardus</i> .....	Do.
1 Bullfinch (alive)...	From Yokohama.....	Capt. Nantes.

## MINOR CONTRIBUTIONS FROM

Mr. A. Abercrombie, Mr. W. E. Hart, Miss Keller, Captain J. F. C. Thatcher, Mr. J. W. Brown, Mr. H. W. Uloth, Mr. W. W. Squire, and Mr. A. McLaren.

## EXHIBITS.

A curiously deformed sambhur horn, picked up near Baroda, by Mr. H. Littledale.

A cutaneous horn grown on a camel's head, by Mr. W. Home, of Jodhpore.

A water-coloured drawing of camels (the Society's Prize Picture at the late Art Exhibition), by Mrs. Scott.

## CONTRIBUTIONS TO THE LIBRARY.

Name.	Presented by
Zoology of Victoria, Decades I. to XVII. ....	Dr. Kirtikar.
Geological Survey of Victoria Reports.....	Do.
Manual of New Zealand : Coleoptera. Parts II. to IV. ....	Do.
Manual of the New Zealand Mollusca .....	Do.
Manual of the Birds of New Zealand .....	Do.
Manual of the Fishes of New Zealand .....	Do.
Catalogue of the Moths of India (Swinhoe and Cotes) .....	From Government.
Report of the Geological Survey of India, No. XXII., Part 2.....	
Catalogue of Manthodea .....	Mr. J. Wood-Mason.

## THE SOCIETY'S JOURNAL.

The Honorary Secretary said that the first two numbers of the Society's Journal were in the Press, but that their publication had been delayed owing to the non-receipt of the coloured lithographed plates from Messrs. Mintern Bros., London.

## MANGO WEEVILS.

The Honorary Secretary stated that if any of the members wished for further information respecting the small beetles (*Cryptorhynchus mangiferae*) found in mango stones, regarding which several letters had appeared in the newspapers, they would find a full account of the insect in Mr. Simmons' pamphlet in the Society's Library.

## PROPOSED ZOOLOGICAL GARDEN.

Mr. H. M. Phipson reminded those present that twelve months had now elapsed since the Bombay Natural History Society had offered to start a zoological garden, provided a suitable site could be obtained. The sum of Rs. 55,000 had been subscribed in a very short time amongst the members and their friends, but the scheme fell through, owing to the refusal of Government to give the Society the use of the required site. The only satisfaction now left to the Society was that their action had drawn public attention to the importance of the subject, and the result was that the Bombay Municipality had sanctioned the Commissioner's proposal to improve

and enlarge the existing collection of animals at the Victoria Gardens. Mr. E. C. K. Ollivant, the Municipal Commissioner, was taking a keen interest in the subject, and had asked the Bombay Natural History Society to assist him by appointing a sub-committee to visit the Gardens once a week, and to consult with him as to the best means of forming a zoological collection which would be a credit to the city. Mr. Phipson hoped the gentlemen who had offered donations a year ago towards the cost of cages, houses, &c., (to be named after them) would renew those offers, now that the Society had determined to help the Commissioner to carry through his scheme.

The following Papers were then read:—

NOTE ON A TALKING BULBUL.

(By Mr. A. W. Morris, F.Z.S.)

Which appeared in No. 2 (Vol. IV.) of this Society's Journal.

"OUR HYMENOPTERA."

(By Mr. Robert C. Wroughton.)

The Honorary Secretary read extracts from this very interesting paper, which he stated would appear in the course of a few days, in the Society's Journal, when it could be studied and enjoyed by the members at leisure. A vote of thanks was passed to Mr. Wroughton for his paper and for the collection of ants, bees, and wasps he had made for the Society.

Mr. J. H. Steel, A.V.D., then read a valuable paper on "The Camel," which will be found on page 207 of this volume.

PROCEEDINGS OF THE SOCIETY'S MEETING ON 10th AUGUST 1889.

THE usual monthly meeting of the Members of this Society took place on Wednesday, the 7th August 1889, Dr. D. MacDonald presiding.

The following new members were elected:—Mr. T. E. Sansom (of Batavia), Mr. E. H. Elsworthy, Mr. James Jardine, Rev. Goldwyer Lewis, Mr. H. Coudrey, Mr. S. Carleton, Mr. A. Murray, Mr. Wm. Tudball, B. C. S., Mr. Chas. Tudball, C. E., and Mr. G. R. Lynn.

Mr. H. M. Phipson, the Honorary Secretary, then acknowledged the following contributions to the Society's Museum:—

CONTRIBUTIONS DURING JULY.

Contribution.	Description.	Contributor.
1 Teddy cat (alive).....	Paradoxurus musanga.	Mr. E. J. Ebdon, C. 3.
1 Snake (alive) .....	Tropidonotus quineunetiatns.	Mr. X. Casteli.
2 Snakes .....	Python molurus, dendrophis picta.	Mr. H. E. M. James, C. S.
Nest and eggs of .....	Common Wren Warbler.	Mr. E. P. Close.
3 Floricans' eggs .....	Sypheotides aurita .....	Do.
1 Purple Coot (alive) .....	Porphyris poliocephalus .....	By exchange.
1 Tailor Bird's nest ...	Ornithotomus sutorius .....	Mr. S. Luard.
1 Snake (alive) .....	Dipsas gokool .....	Do.
1 Lizard (alive) .....	Gymnodactylus Sp. ....	Mr. G. K. Wasey.

CONTRIBUTIONS TO THE LIBRARY.

The Moths of India (Swinhoe and Cetes); from the authors.

Reports of the Geological Explorations in New Zealand; in exchange.

Proceedings of the Linnæan Society of N. S. Wales; in exchange.

Proceedings of the New Zealand Institute; in exchange.



Annali del Museo Civico de Genova; in exchange.

Verhandlungen der zoologisch-botanischen Gesellschaft (Vienna); in exchange.

The Journal of the Asiatic Society of Bengal, Part II., No. 1; in exchange.

#### A VALUABLE ADDITION.

The Honorary Secretary drew attention to the magnificent pair of bison's horns which the Society had been able to secure through the kind assistance of Mr. C. J. Maltby, of Peermaad, N. Travancore. The horns, which were greatly admired by every one present, measure no less than 43 inches across (utmost span). A cordial vote of thanks was passed to Mr. Maltby for his services rendered to the Society.

#### EXHIBITS.

Mr. J. Lyons exhibited a live specimen of the *Thick-tailed Galago* (*Galago crassaudatus*) from the East Coast of Africa. The power which this curious little animal possesses of folding up its membranous ears excited much interest amongst those present who examined it.

Mr. S. Luard exhibited a curious monstrosity of the *Poinciana pulcherrima*, in which the peduncle and rhachis were excessively developed and flattened, being about  $1\frac{1}{2}$  inches broad. On the two flattened surfaces the flowers were crowded together, producing a very gorgeous effect. It was decided to give a sketch of this abnormality in the Society's Journal.

Mr. J. H. Steel, A. V. D., made some interesting remarks on a guinea-worm which had been received from Dr. C. Mallins of Hingoli, which appeared to differ in some important respects from the true *dracunculus*.

#### A BEAR EATEN BY A TIGER.

Some interesting sporting notes by Professor Littledale, of Baroda, were read, amongst which was a singular account of a bear having been killed and eaten by a tiger.

#### NEW RULES.

The new rules which had been drawn up by the Committee were adopted, and it was further decided that a copy of the same should be sent to every member of the Society.

#### THE SOCIETY'S PRIZE AT THE BOMBAY ART EXHIBITION.

Mr. Phipson reminded the members that last year the Bombay Natural History Society offered a prize of Rs. 100 for the best painting of animals at the Bombay Art Society's Exhibition. The prize was eagerly competed for, and produced a large number of interesting pictures at the Exhibition which was held in February last. The Honorary Secretary proposed that the Bombay Natural History Society should repeat their offer of this prize at the Exhibition next cold weather—a suggestion which was unanimously agreed to.

The Honorary Secretary read an amusing paper by Mr. E. H. Aitken, entitled "The Red Ant," which appeared in No. 2, Vol. IV. of the Society's Journal.



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INDIAN BUTTERFLIES





E. L. Doss & Co. Chukerbury d-

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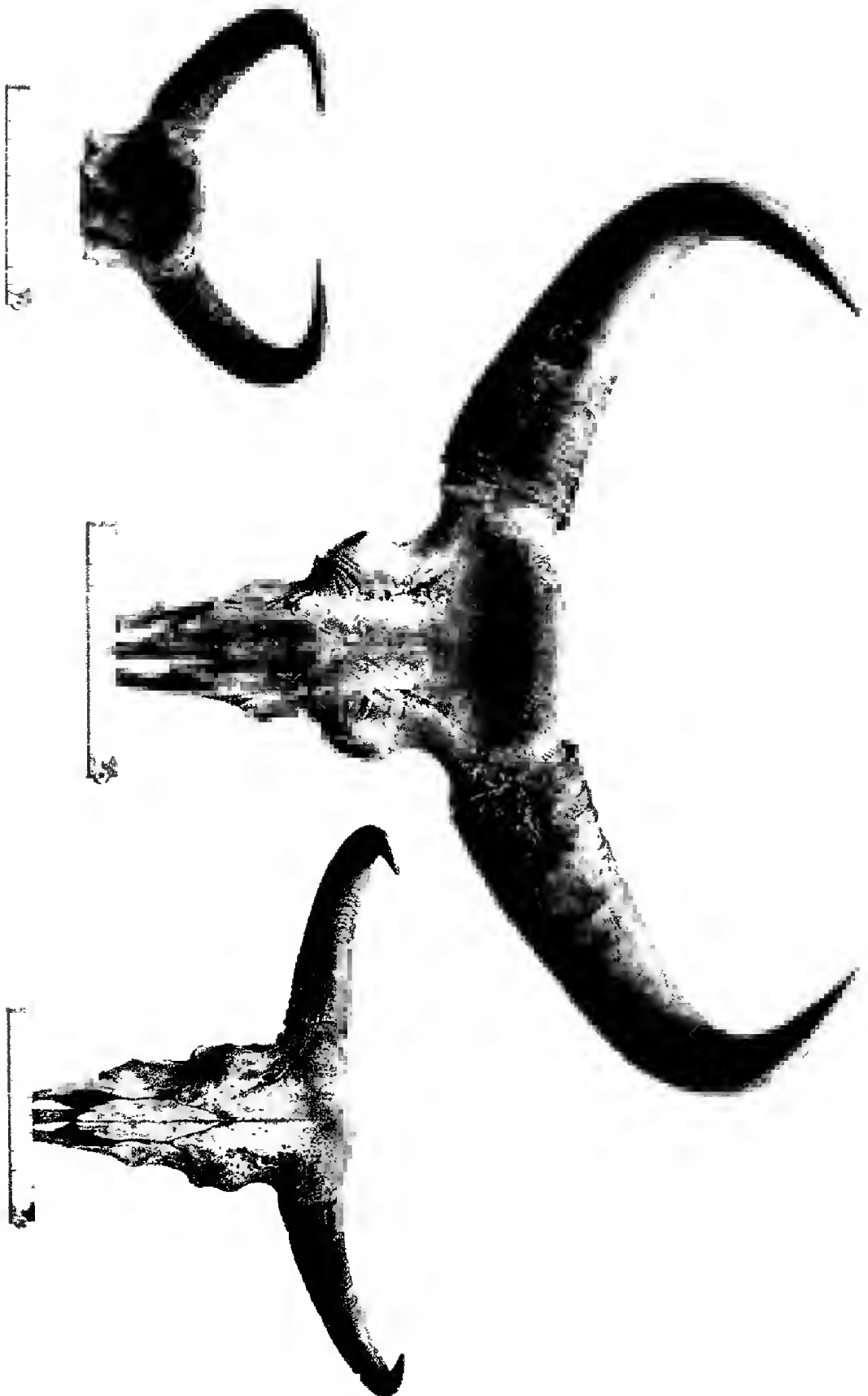


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